6/16

Mine Safety & Health

U.S. Department of Labor
Mine Safety and Health
Administration

December-January

NEWARK PUBLIC LIBRARY
MAR 9 1982
U. S. GOVT. [illegible]
DEPOSITORY [illegible]

Reducing Costly Accidents [illegible]

Explosions, Roof Falls Killed 33 in 51 Days

During a 51-day period in December and January that stunned the Nation's mining community, 33 underground coal miners lost their lives in a series of tragic mine accidents in Kentucky, Tennessee and West Virginia.

The toll:

On Dec. 3, 1981, three miners died in a roof fall at the Elk River Sewell Coal Co.'s Stillhouse Run No. 1 mine, Bergoo, W.Va.

Then came two disastrous explosions on consecutive days. The first, on Dec. 7, killed eight persons at the Adkins Coal Co.'s Mine No. 11 at Topmost, Ky. This was followed on Dec. 8 by an explosion that left 13 dead at the No. 21 Mine of the Grundy Mining Co. at Whitwell, Tenn.

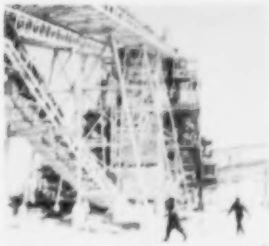
On Jan. 20, 1982, at the R.F.H. Coal Co.'s Joyce Ann Mine at Craynor, Ky., seven more miners died in an explosion. And two days later, two miners died in a roof fall accident at the Phelps Mining Co.'s No. 3 Mine at Phelps, Ky.

MSHA officials said that detailed reports based on intensive on-site investigations and analyses of evidence bearing on circumstances and causes of the accidents are expected to be completed early this Spring.

Mine Safety & Health

U.S. Department of Labor
Mine Safety and Health
Administration

December-January



Page 2

Page 12

Page 17

Contents

Cover
: **Surface facilities of a Louisiana salt mine are depicted in this photo by Earl Mazzeo, MSHA Audio Visual Office, Pittsburgh.**

- 2 **Rinker Southeastern Sets Safety Records, Cuts Medical Costs, Too**
- 8 **Inadequate Materials Handling Cited in Rise in Serious Back Injuries**
- 14 **Winter Quarters Explosion—Part 2...The Disaster in 1900 That Killed 200**
- 21 **Update Section...New technology, publications, legal rulings, public hearings, safety cartoon, safety poster**

Inside back cover
: **Graphs: Recent Trends in U.S. Coal Mine Production and Productivity, 1974-1980**

United States Department of Labor
December/January 1981-82 issue, Volume 6, No. 6

Mine Safety and Health Magazine is published by the Office of Information of the Mine Safety and Health Administration six times a year.

Mine Safety and Health Magazine is for sale by the Superintendent of Documents, $14.00 annual subscription; $17.50 annual foreign subscription. When ordering specify: Mine Safety and Health.

Send payment to: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Please do not send subscriptions to MSHA.

Editorial communications should be addressed to the Editor, Mine Safety and Health Magazine, 4015 Wilson Blvd., Rm. 1237-A, Ballston Tower No. 3, Arlington, Va. 22203.

Material may be reprinted without permission of the editor or the agency, however, the magazine must be credited as the source of material.

The Secretary of Labor has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been extended by the Director of the Office of Management and Budget through March 31, 1982.

Expressions of opinion in articles outside the U.S. Department of Labor do not necessarily represent the views of the Department.

Change of Address: Write to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Raymond J. Donovan, Secretary
United States Department of Labor

Ford B. Ford, Assistant Secretary
Mine Safety and Health

Wayne E. Veneman, Chief
MSHA, Office of Information

Samuel Stafford, Editor, Mine Safety and Health Magazine; Columbus Knox, Art Director; Fred Bigio, Graphics Consultant; Sharon Maines, Editorial Assistant. Photos with article on the Rinker Materials Co. by Don Mader and Sam Stafford; photos with article on back injuries suffered in lifting and materials-handling accidents by MSHA personnel and Acme Machinery, Huntington, W.Va.; photos with article on the Winter Quarters Mine explosion by George Edward Anderson courtesy of the Robert W. Edwards Collection; also, in the last issue of the magazine, Larry Weberg, supervisory mine inspector at MSHA's Bellevue subdistrict field office in Coeur d'Alene, Idaho, should be credited, along with Rene T. Dionne Photography Ltd., for photos used with the article on the Hecla Mining Co.'s Silver Shaft.

Shown above is part of the FEC crushed stone processing plant operated by Rinker Southeastern Materials, Inc. in southern Florida. At right, extending from the screening tower, are several of the seven stacking conveyors which fan out from the tower for transportation of different sizes of rock to stockpiles.

Turnaround Started at the Top

Rinker Southeastern Sets Safety Records, Cuts Medical Costs, Too

The research and writing of the following article on the Rinker Southeastern Materials Co. began late last Fall with the intent of giving readers a prime example of a mining operation that not only sharply reversed a rising accident-injury trend, but in doing so eventually built an accident prevention program so solid that the company won top national honors for its outstanding safety record.

Since the story was written, MSHA has ceased enforcement and other activities at certain types of surface mineral mining operations, including the Rinker operation, as a result of recent Congressional action (see the separate article in the Update section of this issue for more details).

Although MSHA now has no official involvement with operations such as Rinker's, we at the magazine believe that our original reasons for publishing an article about the company are still valid. In short, this company's safety attitude and accident prevention program are among the best we have ever seen. The story that follows is about the many managers, supervisors and hourly employees who have contributed to Rinker's safety achievements.
—The Editor.

By Samuel Stafford
Editor, Mine Safety and Health

After sharply expanding its aggregates production facilities and workforce for several years during the 1970s, the Rinker Southeastern Materials Co. faced a worsening safety situation at its three quarrying operations in southern Florida.

Figures covering activities at Rinker's FEC Quarry, Rinker Lake Quarry, and SCL Quarry for a four-year period tell the story:

- In Fiscal 1975, with a total of 82 workers, there were four on-the-job injuries serious enough to result in lost employee work days, and worker's compensation insurance medical costs to the company were $4,566 (or about $55 per employee);
- Two years later, with the workforce grown to 142 persons, serious accidents caused 19 lost-time injuries, the disabling injury rate based on cumulative hours of work rose alarmingly, and worker's compensation medical expenses soared to $97,894 (or $689 per worker);
- In Fiscal 1978, there were 202 employees at the three mining operations at Hialeah, Fla., and, although disabling injuries decreased slightly to 16, the total worker's compensation medical costs of serious accidents rose to a whopping $139,636 (or about $691 paid out by the company for each employee). The figure of $139,636 was a staggering 30 times higher than the total cost of the company's medical obligations arising from serious accidents four years earlier.

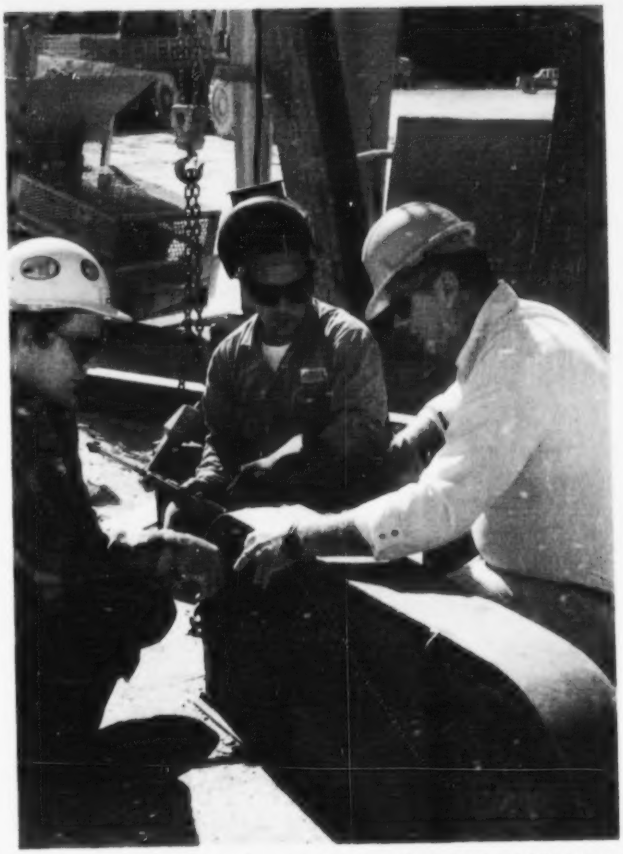
"We wanted balanced, responsible people on the safety committee, people who were enthusiastic about accident prevention work, and we got them... Having company people making these tough, thorough weekly inspections was something new, and it took some getting used to, but the inspections sensitized both supervisors and workers to causes of accidents."

Considering the multiple effects of the accidents occurring at the Rinker aggregates operations—the human suffering resulting from mangled limbs, broken bones, damaged eyesight, wrecked backs and other types of serious injuries; the rising worker's compensation insurance medical expenses; and the losses of costly production equipment and skilled personnel for varying periods of time—top corporate management moved forcefully to turn the dismal safety situation around.

What happened thereafter is today seen by some old hands at Rinker Southeastern Materials, Inc. as nothing short of amazing.

During the next two fiscal years, lost-time injuries were reduced by two thirds—to five in the second year—while worker's compensation medical costs were reduced to $24,038, a saving to the company of $115,597 from the Fiscal 1978 cost figure. Further, these gains were accomplished during a period when 75 more employees were added.

Today, the Southeastern Materials operations are nationally recognized as having a superior, highly participatory mine safety program.



Mechanic-welder Oscar Socarras, center, discusses modifications being made to strengthen a pinch point guard for a shaker screen with, left, Don Mader, personnel-safety supervisor at Rinker Southeastern Materials, Inc., and Doyel "Red" Liston, general operations superintendent at the Rinker Lake Quarry. The company has an exemplary equipment guarding program.

Visible proof of this high standing was an event that took place last Dec. 5. At a ceremony at Rinker's Hialeah facilities that day, supervisors and employees of the FEC Quarry were honored for winning a top trophy in the Sentinels of Safety competition sponsored by MSHA and the American Mining Congress for achieving the best safety record—268,569 employee-hours worked without a lost-time accident—of all U.S. open-pit quarries during calendar 1980. Moreover, at the time of the December 1981 ceremony, there had been no lost-time injuries at two of the three quarries during Fiscal 1981 and only one lost-time injury reported for the year to date at the third operation. Also, worker's compensation medical costs per employee are now nearing the levels of seven years ago.

The turnaround is evidence of what a highly motivated management team can accomplish with strong support from the very top. It began with a decision by M. E. "Doc" Rinker, Sr., president and board chairman of the Rinker Materials Co., to formalize and strengthen safety training at Rinker's aggregates division along the lines of safety programs that had been successfully established at other divisions of the company.

Alfredo Quintana, an employee of Rinker's aggregates division, uses a fire extinguisher to put out a controlled blaze in a remote quarry area as part of the company's firefighting training as another employee serves as backup fireman.

Founded by M. E. Rinker 55 years ago, the Rinker Materials Corp. has four subsidiaries: Rinker Southeastern Materials—the aggregates division—and a materials division, a cement division and a real estate division. In 1975, Southeastern Materials started production at its modern, extensive FEC crushed stone plant, and the aggregates quarries and plant now produce 2,000 tons of materials an hour for use by Rinker's 45 ready-mixed concrete plants and 15 concrete block plants in eastern and southern Florida.

Serious injuries and worker's compensation insurance medical bills for Rinker Southeastern Materials, Inc. Fiscal Years 1975 through 1980.

Fiscal Year	Lost time injuries	Worker(s) compensation insurance medical cost	Number of employees	Cost per employees
1975	4	$ 4,566	82	$ 55.68
1976	4	$ 15,872	87	$182.44
1977	19	$ 97,894	142	$689.34
1978	16	$139,635	202	$691.26
Full-time safety program is started on April 1, 1979				
1979	16	$ 50,415	271	$186.03
1980	5	$ 24,038	277	$ 87.00
1981*	1	—	280	—

* Nine months

In the tradition of those who have built their own businesses from the ground floor up, Rinker, whose sons also are active in company affairs, keeps close contact with key managers at the company's scattered operations. Through phone calls from his West Palm Beach office, meetings held there, and personal visits to operating sites, he and his top administrators stay conversant with day-to-day concerns or potential problems at the operating levels. The company prides itself on organizational development and on its program to select, train and advance supervisory people and wage personnel, on its ability to deal with problems as they arise, and on good communications among the various company levels.

In 1978 and early 1979, Rinker met several times with Al Alvarez, who had been promoted from personnel-safety supervisor at the cement mill to district personnel-safety administrator in Miami with responsibility for programs of the aggregates, cement and materials divisions.

Among other topics, they discussed how best to implement MSHA's mandatory safety training requirements under the Federal Mine Safety and Health Act of 1977 which were due to go into effect in March 1979. The decision to establish a full-time safety position at the aggregates division reflected both the need to develop a formal training program and concern over rising lost-time injuries. Don Mader, then with the materials division, was given the newly created job.

"Establishment of the full-time safety job was the first step in building the kind of structured safety program we wanted at our quarry operations," Alvarez said. "The formal accident prevention programs we had at other divisions had previously proved their value in keeping lost-time injury rates low."

Mader, who had management training skills but no specific mine safety training background, began working with inspectors J. J. Crisp and Harry Verdier, of MSHA's Bartow, Fla., field office to familiarize himself with the specifics of surface mining hazards, and "studied everything about mine safety I could get my hands on." He later became an MSHA-certified safety training instructor.

In drafting a formal safety training plan for the quarrying operations, Don Mader relied heavily on the advice and experience of Bill Youngman, the personnel-safety supervisor at the cement mill, which already had an effective accident prevention program. Al Alvarez coordinated development of the training program with the corporate headquarters staff.

The overall safety program that evolved between 1979 and the present is unusually imaginative, and, in several important respects, has exceeded MSHA standards. Two ingredients of all good safety programs have been present from the start—strong support of the top man, M. E. Rinker, Sr., and effective communications of safety policies and procedures between management and the workforce.

With formal safety training and retraining courses under way, the aggregates division set up a joint management-labor safety committee to make regular inspections of all operations, including the removal of overburden by big draglines, drilling, blasting, excavation, haulage, loading, screening of materials, stacking, loadout and other activities, and to pinpoint hazardous practices and conditions, recommend actions to correct unsafe situations, and follow up the hazard reports to make sure recommendations have been carried out in the working areas. The safety committee originally was organized with 15 members, five of them supervisors and the rest hourly employees.

A 480-W Bucyrus-Erie electric walking dragline excavates material from the lake at Rinker's aggregates operation. The wet material is stockpiled to drain, then loaded into trucks to be hauled to the processing plant.

Gina Lucignani, an equipment maintenance worker at the Rinker crushed stone operation, discusses the use of hearing protection equipment with Don Mader, personnel-safety supervisor for the aggregates division.

At that time, the situation in the work areas—poor equipment guarding, bad conveyor "pinch point" problems, the failure of workers and some supervisors to wear basic personal protective equipment, and other hazardous conditions and practices—was hardly encouraging.

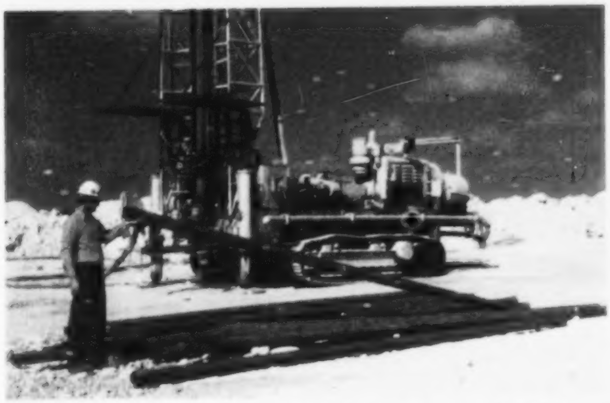
Mader said, "We wanted balanced, responsible people on the safety committee, people who were enthusiastic about accident prevention work, and we got them. All our members have been very gung-ho about safety.

"Having company people making these tough, thorough weekly inspections was something new, and it took some getting used to. But the inspections were very effective in sensitizing both supervisors and workers to causes of accidents."

Along with the joint labor-management safety committee, the company developed a system of warnings and involuntary furloughs to enforce good safety practices among employees.

For a first violation, a worker is given an oral warning. A second infraction brings a formal, written warning that goes into the employee's personnel file. Subsequent cumulative violations—depending upon their seriousness and the safety attitude of the employee—can cost a worker from one day to a week off work without pay. Mine vehicle drivers are assessed points if they are involved in accidents or serious driving infractions. A driver receiving a specified number of points no longer is allowed to drive on a Rinker operation.

"The great majority of our employees are good, conscientious workers," Mader said. "They just had not had much safety awareness in the past, and our job was to find ways to develop safety consciousness in them. We worked through the area superintendents with specific direction from the general manager, operations, to correct hazardous conditions and get employees to comply



A drilling crewman checks sections of resin-impregnated fiberboard tubing used to line quarry blastholes. The cylinders prevent walls of the holes from collapsing due to the extremely wet ground conditions at the site. Rinker Southeastern was among the earliest Florida quarrying operations to adopt the tube-cased explosives loading system to replace hollow steel "Kelly bar" loading methods which later were barred by MSHA as being too hazardous. In the background is a Gardner-Denver Model 1000 drill rig.

with safety committee recommendations."

The new safety program put heavy emphasis on such basics as the wearing of personal protective equipment—hardhats, safety glasses and steel-toed shoes, and, in a few instances, disciplinary warnings and suspensions were applied to workers for non-compliance with safety rules.

"We had 14 eye injuries in May and June of 1979 alone," Safety Supervisor Mader said. "We knew we had to turn this around so we established a mandatory safety glasses program based on a program they had at the cement mill."

The company originally spent about $2,000 for 75 pairs of prescription safety glasses and $1,200 for plain safety glasses for workers with normal eyesight, and has since spent an added amount for replacement lenses and glasses. Clear, gray, green and amber lenses are provided for use under varying light conditions (some night maintenance men reportedly favor amber lenses for working under bright lights). Although the lenses can withstand frontal blows of tremendous force, they can easily be popped out so that lenses of other shades can be substituted. The earpieces also are adjustable.

"We required strict enforcement of rules on wearing personal safety equipment," Mader said, "and we made sure that protective equipment was available to everyone. We've had very few eye injuries since then, and these have usually been minor injuries such as those in which silt or water got into the eye."

The safety glasses program has prevented much suffering and, from the standpoint of the company, has kept skilled workers on the job, rather than in the hospital. Although the safety glasses were relatively expensive, the program, on a dollar-and-cents basis, has undoubtedly saved the company many times the original cost of the glasses through savings in potential medical expenses that were never incurred.

One employee who has become a strong supporter of the safety glasses program is Alberto Mena, a mobile equipment maintenance worker.

On Aug. 5, 1980, as Mena was removing a broken cable from a small crane, a wedge holding the dead end of the cable broke loose, causing the cable end to whip back toward Mena and strike the right lens of his safety glasses with such force that one earpiece was broken off and the glasses frame gouged a cut over his right eyebrow that required seven stitches to close.

Examining physicians said there was no doubt that he would have lost his right eye if he had not been wearing safety glasses.

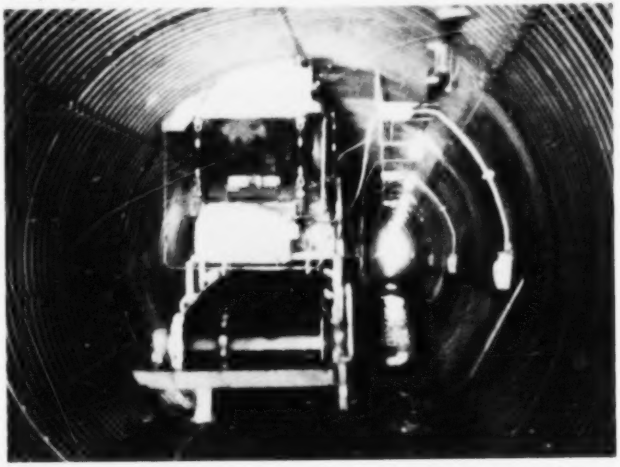
Other employees who have reason to be thankful for Rinker's eye protection program include Charlie Radford, a member of the machine shop dragline and track equipment maintenance crew.

On Oct. 16, 1981, Radford was lubricating a dragline shaft and bushing with Crator, a viscous open-gear lubricant. Because of mechanical problems with the assembly, shaft and bushing wear had occurred and both parts were heated to about 180 degrees F. Suddenly, the hot lubricating agent squirted from between the drag shaft and bushing, striking Radford on the face and upper chest below the throat. Although he suffered burns, his eyesight was saved, thanks to the safety glasses he was wearing.

Eugene Pulaski, Rinker Southeastern's general manager, operations, from June 1979 to the Summer of 1981, and his successor, Ken Hoganson, have both strongly supported the safety program.

One of the most difficult challenges a safety specialist faces is trying to find ways of developing safety consciousness among the workforce.

"You can get good results engineering out the safety hazards by providing all workers with safety glasses or safety chains or building equipment guards and hand rails," Mader said, "but it takes time and a lot of persistence to develop good safety attitudes among employees."



The vibrating feeder shown in a "loadout" tunnel located under stockpiles of different sizes of rock is part of a sophisticated, electrically controlled Syntron automatic rock blending and loading system at the Rinker operation. The system permits precise blending of desired grades of materials from different stockpiles of aggregate rock and the movement of specified amounts of rock on reclaiming belts to truck and rail loading facilities.

Although some older employees at the operation had difficulty breaking bad working habits, other longtime workers had no trouble adjusting to the new safety requirements.

"Some of them had worked for many years and never even had a first-aid injury," Mader said. "They had developed the habit of taking a quick look at everything around them before starting a job. It wasn't a conscious thing. It was more of an attitude of wariness. If somebody had forgotten to put a guard back on a belt or had spilled oil on a walkway, they knew it, and they made sure everything was just right before they went to work.

"It's an unforgiving environment out there. We have more than a mile of high-speed conveyor belts, and we do a lot of trucking and blasting. Anybody who isn't very careful runs the risk of being seriously hurt.

"This is the message we have tried to get across. We try to convince them that we're talking about the actual eye injuries or back injuries that have occurred in the pits. In other words, there are real reasons for these safety policies and procedures. They aren't just ideas that somebody in the front office dreamed up to complicate their jobs."

Today, safety attitudes throughout Rinker's aggregates division are excellent, a far cry from the state of safety awareness at the operation only a few years ago.

"We don't make a big deal about it," an hourly worker said. "Around here, if there's a safety violation, we just fix whatever's wrong and get it over with."

Like M. E. Rinker, Sr., who periodically travels to different operations to listen to the suggestions and complaints of small groups of employees, Ken Huganson, the aggregates division's general manager, operations, makes a point of encouraging dialogues between management and workers on both production and safety concerns.

"We have a open-door policy here," Hoganson said. "Anybody can come into my office and speak his piece, and they do, but I'd rather go out in the quarries and see them than have them come to me. We can have a better talk out there and I can see the problems first-hand."

Because its workforce contains many persons from Cuba, Central America, Asia and Europe who are not fluent in English, the company has had to develop ways of overcoming barriers to effective communications of policies and procedures. This has been done largely by using supervisors and crew chiefs who speak and understand English, Spanish and other languages.

Doyel "Red" Liston, general operations superintendent at the Rinker Lake Quarry, said, "Our people make a lot of safety suggestions. Some of them are far-fetched and don't have too much to do with safety, but we get a lot of good ideas and we go along with them whenever we can. If it looks like something that will eliminate a hazard, we go ahead and do it. Nobody has to go through channels to sell an idea."

The esprit de corps in carrying out accident prevention activities is evident from the exceptionally low accident-injury rates of a number of Rinker working units.

Among these are the 30 workers on the night plant maintenance crew who work in the open with heavy wrenches and welding and cutting equipment high off the ground in wet, artificially lighted conditions repairing or replacing screens on the screening tower, changing out conveyor rollers, and doing other potentially hazardous jobs.

Alberto Mena, a mobile equipment maintenance worker, has reason to support the company's program to strictly enforce the wearing of safety glasses. In 1980, as Mena removed a broken cable from a crane, the cable end whipped into his face striking the right lens of his safety glasses with such force that the frame gouged a cut on his forehead that required seven stitches to close. Physicians said Mena certainly would have lost sight in his right eye if he had not had eye protection.

Mader said that Ron Pingle, the general superintendent of maintenance and production for the FEC mill, and his foremen are "good examples of the strong safety attitudes many of our people have," adding, "They're safety conscious all the time, and this attitude is communicated down to all their lead men (crew chiefs) and hourly employees."

The same kind of devotion to safety, the personnel-safety supervisor said, is reflected in the outstanding accident prevention record of the dragline and tracked equipment field maintenance crew, among other exemplary work units. The crew, headed by Tom Deaner, maintains mobile equipment at all three quarries.

Subjects regularly covered in required safety training courses include: electrical hazards; slips and falls; safe work practices around mobile cranes; loading and hauling dangers; safe work habits around conveyor belts; electrical hazards; use of personal protective equipment—goggles, face shields, hardhats, steel-toed boots, gloves, respirators and hearing protection; eye safety and health; transportation and communications systems, including proper radio procedures; fire prevention; back injuries and correct lifting methods; explosives hazards; and the proper maintenance of small hand tools.

Although cardiopulmonary resuscitation training is not required, the company plans to add it to existing first-aid courses in the future.

If possible, Mader tries to relate lessons learned from past accidents to current topics of training classes and safety meetings. He also encourages employees to take an active part in safety demonstrations held in working areas. As part of fire emergency training, for example, each division worker uses a fire extinguisher to put out a sizeable controlled blaze.

(continued on Page 27)

Although some types of injuries in coal mining have decreased in recent years, the number of disabling back injuries suffered in materials handling and lifting accidents has been increasing, pointing to the need for more mechanization of tasks involving lifting, pushing or pulling. Above, a miner builds a concrete block stopping, used in underground coal mines to maintain ventilation in active areas and to close off old passageways. Building a typical stopping may require 80 or more blocks each weighing 60 to 70 pounds. Repeated lifting, both overhead and from ground level, is required during loading, unloading and construction, and severe back injuries to workers are not uncommon.

Lack of Mechanization in Some Coal Mine Tasks

Inadequate Materials Handling Cited In Rise in Serious Back Injuries

By Herschel H. Potter
Chief, Division of Safety, Coal Mine Safety and Health

Back injuries resulting from lifting and materials handling accidents have been and continue to be one of the most constant and undiminishing problems in the occupational environment. Back pain in one form or another is experienced by almost everyone, evidence that the human spine is the most vulnerable area of the musculo-skeletal system. But while a considerable amount of accident prevention education has been directed at this problem over the past 30 years, there has been little statistical change in the incidence of the injury. Overall, back injuries account for about 400,000, or 18 percent, of all disabling work-related injuries each year, according to National Safety Council figures, and in 1976 they resulted in an estimated cost of more than $1.9 billion in medical and lost-time pay.[1]

In the coal mining industry in recent years, there has been a dramatic increase in the number of disabling injuries, and more pointedly in the number of disabling injuries involving the back. While incidence rates in the long run have declined drastically over the decades in a number of other accident categories, the materials handling and lifting problem seems to be a persistent one. In that light, it is important to review briefly, from a historical perspective, the technological advancement achieved by the mining industry over the past 40 years.

In the 1940s, the coal mining industry began to replace hand loaders with mechanical loading machines. With this advancement, the mechanization of coal mines was underway. Advances in the production of coal with mechanical equipment have kept pace in more recent times. Two good examples are longwall mining and the technique of hydraulic mining. What has not kept pace with mechanization is materials handling. The term "materials handling" is used here in a very narrow sense to mean the handling of supplies and materials, but not handling of refuse or minerals. Basically, the methods of handling and transporting materials today is much the same as it was 40, 50, and even 60 years ago. On the other hand, the logistics of supplying a continuous mining section is much more complicated today. Greater amounts of material are needed because the working places are advancing at a faster rate than before.

Unfortunately, the need for an effective materials-handling system generally is not identified as being an integral part of the production cycle. Yet without blocks for constructing stoppings, without rock dust to make combustible materials inert, or without the roof bolts, crossbars and posts required to support the roof, a potentially productive operation would soon be lost because of poor planning. If effective materials-handling systems were developed, productive capabilities of mining operations could be increased, and materials handling type accidents could be drastically reduced.

It is well known that when a need to develop or design equipment to improve production is identified, the mining industry has found a way. Special roof support equipment has been designed and manufactured to help the miner keep the roof properly supported in working faces so that the production cycle is not interrupted. Electrically-powered coal drills were developed when hand-held drills could not keep up with the production cycle. In some parts of the country, small front-end loaders called "bobcats" are used to clean up loose coal and coal dust in order to maintain the fast-paced production cycle.

In 1980, the coal mining industry reported 8,024 lost-worktime injuries associated with materials handling or about 53 percent of the total of 15,075 nonfatal days-lost injuries for that year. And for the previous year, about 51 percent of all disabling injuries involved materials handling accidents, many of which resulted in back injuries.

Machines such as the one shown above have replaced manual labor in lifting heavy wooden posts into place as roof supports in certain underground coal mines. In many others, however, miners lift and place mine timber, lay haulage rails and do other work to support actual production using methods followed by miners 50 or 60 years ago. During 1979 and 1980, more than half of all lost-worktime injuries in coal mining involved materials handling.

Why then has this same response been lacking in the face of a persistently high rate of disabling back injuries in coal mining? Clearly, the mining industry must do much more to identify the need and develop equipment for the lifting and pulling which has been done over past decades by manual labor.

In 1979, the coal mining industry reported to MSHA's Health and Safety Analysis Center (HSAC) a total of 7,782 nonfatal days-lost injuries associated with materials handling, and, in 1980, the industry reported 8,024 nonfatal lost-worktime injuries due to this cause. During the same years, a total of 15,256 and 15,075 nonfatal days-lost injuries were respectively reported. In each of these years then, nonfatal days lost injuries associated with materials handling have been about 51 and 53 percent of the total number. An HSAC study of these types of injuries in 1979 points to the staggering cost to the coal mining industry for back injuries alone, and shows that when other reported injuries which are assumed to have resulted from lifting, pulling, and strains and sprains are added to the totals, the cost becomes appalling.

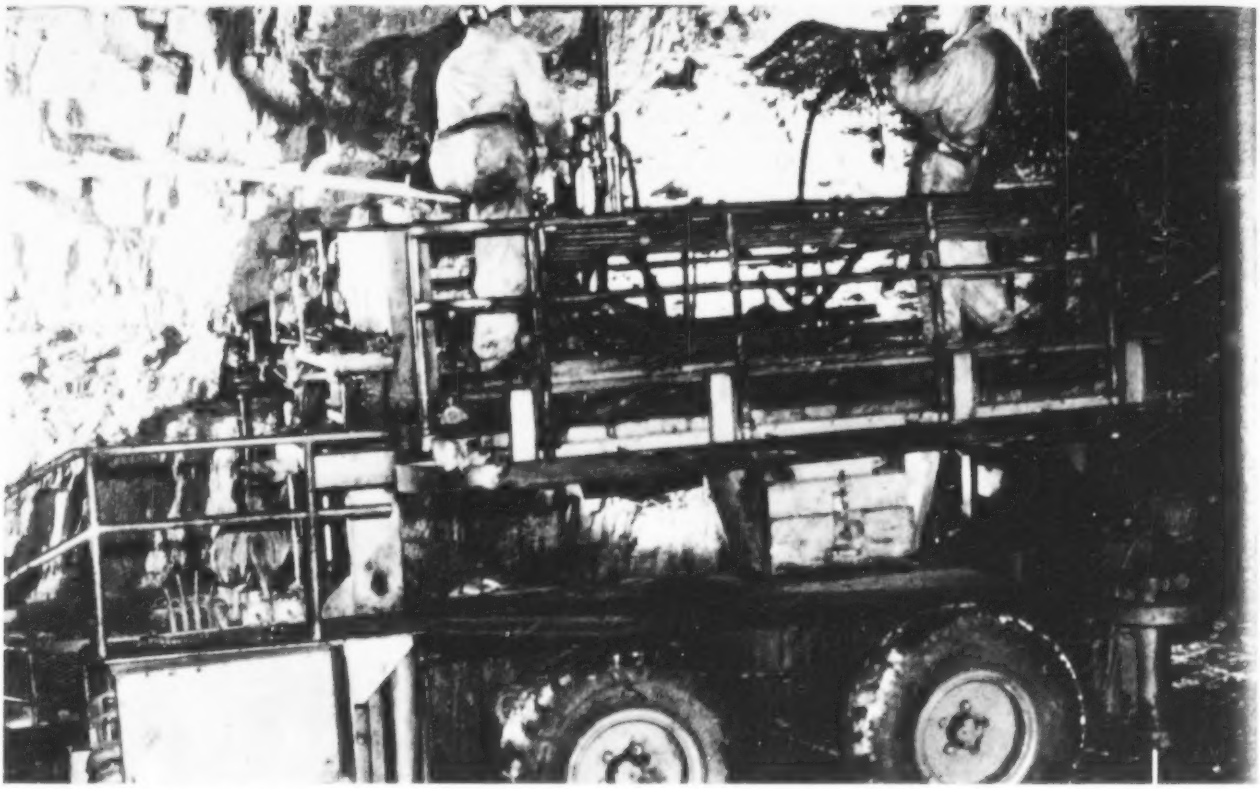
A review of injury statistics for the 20 largest coal-producing companies reveals that collectively 53 and 55 percent of their reported nonfatal days-lost injuries in 1979 and 1980 were associated with materials handling. One large coal company reported 1,291 injuries in 1980 which resulted in 10 deaths, 309 injuries in which no work days were lost, and 982 injuries in which there were

Coal mining back-related injuries, 1979 and 1980

	Injuries reported		Back-related injuries		Percentage	
Industry	1979	1980	1979	1980	1979	1980
All coal mining (MSHA data)	15,256	15,075	7,782	8,024	51	53
Controlling company coal mining*	8,565	8,002	4,501	4,432	52	55
Other industries, including some mining†	1.85 M	—	304,316	—	16	—

* MSHA data—top 20 controlling coal companies.

† Bureau of Labor Statistics: Workers Compensation records.



This elevated drilling platform gives workers access to the higher mine areas while eliminating many of the overhead lifting, reachin and pushing movements that otherwise would result in lost-worktime back injuries.

lost-work days. Of these, 298 were back injuries and only four of this number were not lost-work-day injuries. Overall, 30 percent of the company's reported injuries were back injuries, and these resulted in 13,862 lost-work-days or 47 days lost per injury. That is the equivalent of about 63 miners on the payroll who performed no work in 1980.

This same company has repeatedly maintained that 88 percent of its lost work time injuries are caused by the unsafe acts of miners. This presumption raises several questions that could be asked of management. What percent of back injuries are the result of personal carelessness? What steps has management taken to prevent back injuries? Is the teaching of proper lifting techniques by itself sufficient to prevent back injuries, considering the coalbed heights in which miners work? What efforts have been made to mechanize materials handling? And when supplies are being purchased, does mine management specify the size and weight of the materials to be packaged? I believe that the answers to these questions could give us a much better picture than we now have about the causes of back injuries and the measures that can or should be taken to prevent them.

Weights of common coal mine supplies usually placed by manual labor (in pounds)

Roof bolts, ⅝" x 6', bundle of 10	55
Rebar, ¼" x 6', bundle of 10	90
Roof bolt shells, box of 25	25
Roof bolt plates, 6" x 6" x ¼", bundle of 10	27
Crossbar, oak, 4" x 6" x 16'	129
Round post, oak, 6" diameter x 6'	57
"H" beam, 16' x 6" x 6" x ⅜" flange	320
Stringer, 60 pound rail, 16'	310
Concrete block, 8" x 8" x 16"	62
Cement, one bag	80
Rock dust, one bag	50
Rail, 30 pound, 30' length	300
Rail, 60 pound, 30' length	600

Thanks to mechanization, tonnage per employee hours worked has risen dramatically, reducing the amount of employee exposure to on-the-job hazards. But while new production techniques in working faces require far less physical effort today was true 50 years ago, many support tasks have basically remained unchanged since the hand loading days. Take track laying, for instance. Though the railroad industry long ago developed automated rail-laying devices, much of this work in underground coal mining is still performed manually. It is not uncommon to see two miners laying down a 30-foot-long, 300-pound section of rail by themselves, and in some cases, with 60-pound rail (the rail weighs 60 pounds for each three feet), four miners will lay by hand a 30-foot-long section weighing 600 pounds.

In the simple task of building a concrete stopping, a miner will use as many as 80 blocks, weighing up to 60 to 70 pounds apiece, to construct a stopping which measures

Mechanization has dramatically increased tonnage per employee hours worked and reduced employee exposure to on-the=job hazards. But if production techniques require far less effort than they did 50 years ago, many support tasks have changed little since the hand loading days...

At some mines, small "bobcat" front-end loaders are used to clean up loose coal and coal dust to maintain the fast-paced production cycle. The same kind of devotion to mechanization, the author contends, should be applied to the transportation and handling of essential mine materials in which manual labor still plays a large part, contributing significantly to a rise in the rate of disabling back injuries in coal mining.

six feet high and 20 feet wide. In most cases, the blocks will be handled at least four times from loading and unloading of the supply car to placement of blocks during building of the stopping. A survey of other commonly handled materials—from packages of roof bolt plates to bags of rock dust or cement—shows that heavy loads are routinely handled during a production shift by any number of miners. Quite often the packaging of these loads, methods of transporting them, and procedures for the methods of their transportation and their handling are wholly inadequate.

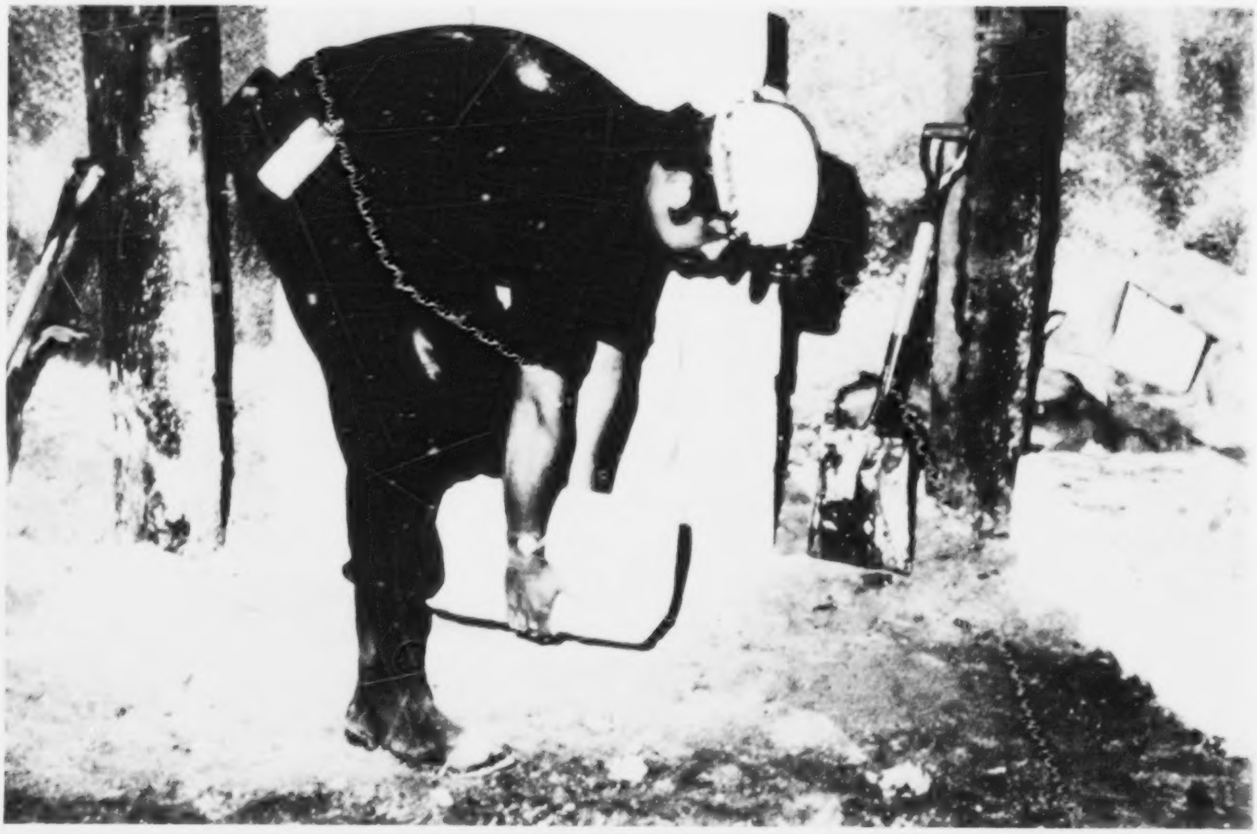
The burden of evidence about methods of lifting loads from the floor or near floor level argues for the following techniques: (1) feet far enough apart for balanced distribution of weight; (2) knees and hips bent, back reasonably straight; (3) arms as near to body as possible, with load as close to body as possible; (4) wherever possible, use of the entire hand, not just fingers; (5) lift smoothly with no jerks.

The actual lifting is performed largely by an extension of the legs.[2] This lifting method strongly suggests that the person performing the lifting will straighten up with the load. If this is true, then in coalbeds with sufficient height, this method may prevent some back injuries. In coalbeds with restrictive heights, this method certainly has some shortcomings. Keep in mind that most coalbeds mined today are less than 60 inches in height.

Causes of injuries to coal mine employees in West Virginia for 1981*

	Nonfatal lost time injuries							
	Jan	Feb	Mar	Apr	May	June	July	Total
1. Falls of roof (rock, slate, or coal)	24	34	43	7	1	14	45	168
2. Roof fall due to car, machine, or equipment knocking out post	0	0	0	0	0	0	0	0
3. Falls of face or rib. 3a. Bursts or bumps from pressure	6	2	11	2	0	2	6	29
4. Rush of coal, rock, or gob	0	0	0	0	0	0	0	0
5. Falling materials or objects not being handled by workers	15	21	27	7	1	4	18	93
6. Falls or slips of persons	81	89	118	25	1	23	54	391
7. Handling materials	**137**	**141**	**183**	**32**	**14**	**20**	**21**	**548**
8. Hand tools	7	10	15	3	0	3	17	55
9. Stepping or kneeling on sharp or loose objects	14	11	27	4	1	2	7	66
10. Striking or bumping against objects	27	20	43	9	1	15	41	156
11. Haulage	47	41	63	10	3	22	38	224
12. Explosions of gas or coal dust	0	0	0	0	0	0	0	0
13. Explosives (not including explosions or dust)	0	0	0	0	0	0	0	0
14. Electricity (not resulting in explosions)	5	5	10	3	2	1	4	30
15. Machinery	27	20	29	10	2	6	19	113
16. Suffocation (no flame or smoldering, other than 12, 13, 17)	0	0	0	0	0	0	1	1
17. Mine fires (burns, suffocation)	0	0	0	0	0	0	4	4
18. Lifting, pulling, or pushing	**74**	**116**	**154**	**27**	**4**	**38**	**77**	**490**
19. Miscellaneous	2	2	1	1	0	3	15	24
Totals	466	512	724	140	30	153	367	2,392

* Data supplied by the West Virginia Department of Mines.



Weight lifters know that they must lift heavy barbells from the floor with a smooth motion, keeping their legs bent and their backs vertical to the floor. The weight being lifted follows a vertical line upward that begins at a point between the feet which are positioned far enough apart for balanced distribution of weight. Lifting is done largely by extending the legs. Above, a miner who knows proper lifting techniques demonstrates the wrong way to lift a concrete block. Miners who do likewise not only risk a wrenched back but also are less efficient than they would be if they lifted heavy objects the right way.

However physically strong a miner may be in some instances, the human spine is simply not built in such a way as to routinely tolerate many of the typical load weights common in underground coal mining. The International Occupational Safety and Health Information Center has proposed several recommended weight limits which are classified by age groups and sex. A limit of 55 pounds was proposed for men between the ages of 20 and 35 and a limit of 33 pounds proposed for women in the same age group, the maximum weight limits among all classifications. Limits of 45 pounds for men and 29 pounds for women were proposed for persons in the 35-to-50 age range. In one survey of industrial workers in this country, it was found that 69 pounds is the maximum acceptable weight limit for only 10 percent of males in industrial occupations when lifting is from knuckle to shoulder height, and that about 50 percent can lift a maximum of 42 pounds from shoulder to reach height without undue strain.

Surprisingly, it appears that little thought has been given to the development of mechanical equipment or methods which would considerably help miners in the lifting and materials handling tasks that so frequently result in strains, sprains, and in some cases, seriously disabling back injuries. Mechanics, repairmen, electricians and others involved in mining jobs requiring manual labor suffer the largest number of back injuries, and, considering the absence of mechanical aids in these occupations, the reasons for the frequency of these injuries are obvious.

Recommended lifting limits for specified age groups* (in pounds)

Age:	14-15	16-17	18-19	20-34	35-50	Over 50
Male	33	42	51	55	45	36
Female	22	26	31	33	29	22

* Recommendation proposed by the International Occupational Safety and Health Information Center covering reasonable weight limits for occasional lifting by any method, taking into account the relationship between efficiency and age.

Maximum acceptable lift limits for industrial workers

Percent surveyed capable of lift	Lifting Capability (pounds)					
	Lift: Floor - knuckle		Lift: Knuckle - shoulder		Lift: Shoulder - reach	
	Male	Female	Male	Female	Male	Female
90	37	19	40	23	36	18
75	42	21	47	25	42	22
50	53	33	55	27	42	27
25	65	39	62	30	49	31
10	76	46	69	31	56	35

I believe that if the mining industry began to suffer production losses because of inherent design flaws in production equipment, there would be a strong effort to modify, retrofit or redesign the equipment. Even though we cannot redesign the human back to make it perform as many believe it should, we should at the very least recognize the limitations of the back and begin to identify and attack the root causes of accidents involving back injuries.

"Accident prevention," according to author H. W. Heinrich, "is both a science and art. It represents, above all other things, control—control of man performance, machine performance and physical environment. The word 'control' is used advisedly because it connotes prevention as well as correction of unsafe conditions and circumstances."[3]

> ***...Little thought has been given to the development of mechanical equipment or methods which would considerably help miners in the lifting and materials handling tasks that so frequently result in strains, sprains or seriously disabling back injuries...***

The high incidence of back injuries in materials handling indicates that present efforts to reduce back injuries in the coal mining industry are ineffective. Accidents involving back injuries need to be studied from the point of view of its human factors, the waste of human resources in terms of production, injuries, absenteeism, labor turnover and job satisfaction.

Too many people say that there really isn't any solution to the back injury problem since most cases are the results of "goldbricking" and "malingering" just to get a few days off. Even granting that there are instances of malingering in the back injury statistics, however, there is no reason to resort to this argument to avoid dealing with the serious problem of actual injuries that do occur.

The question can be asked, "Why hasn't automation been used to mechanically handle materials?" The cost of materials handling has not included recognition of injury statistics, medical costs, lost-time and compensation costs.

Heinrich further noted, "An injury is the result of an accident. The accident itself is controllable. The severity or cost of an injury which results when an accident occurs is difficult to control. It depends upon many uncertain and largely unregulated factors such as the physical and mental condition of the injured person, the weight, size, shape or material of the object causing the injury, the portion of the body injured, and so on. Therefore, attention should be directed to accidents as properly defined, rather than to the injuries they cause."[4]

In conclusion, if you are experiencing back injuries in your operation, your safety program has not addressed the problem. You must go back to the basics and determine the root cause of the accident which resulted in the back injury. Then, and only then, will you be able to develop programs for the prevention of back injuries and injuries associated with materials handling.

---

1. National Safety Council, **Accident Facts**, 1978
2. McCormick, Earnest J., **Human Factors in Engineering and Design**, Fourth Edition, McGraw Hill, 1976, page 180
3. Heinrich, H. W., **Industrial Accident Prevention**, Fourth Edition, McGraw Hill, 1959, page 4
4. Ibid, page 29

CHANGE OF ADDRESS FORM

Name-First, Last

Company Name or Additional Address Line

Street Address

City **State** **Zip Code**

(or) Country

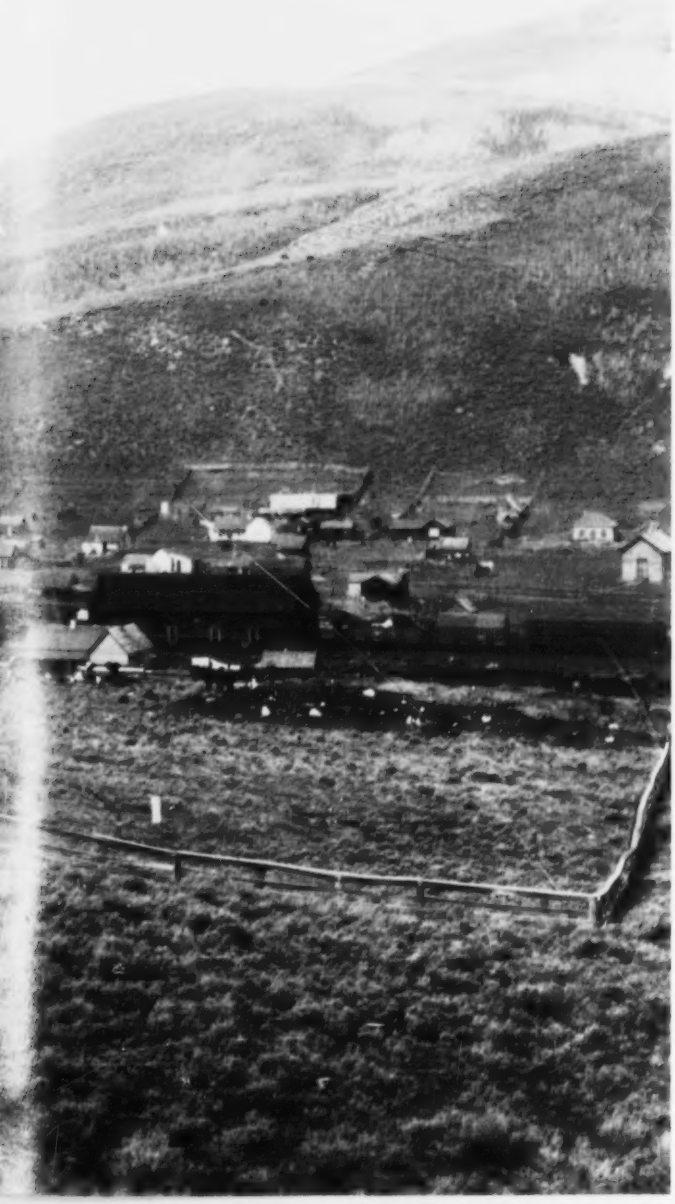
PLEASE PRINT OR TYPE

Mail this form to:
NEW ADDRESS
Superintendent of Documents
Government Printing Office SSOM
Washington, D.C. 20402

Attach last subscription label here.

Winter Quarters Explosion--Part 2

The Disaster In 1900 That Killed 200



(Second Article of two parts)

Residents of Scofield and Winter Quarters, two of Utah's booming coal mining communities, began the morning of Tuesday, May 1, 1900, in a festive mood as they planned to attend the various celebrations scheduled to mark the third anniversary of Admiral Dewey's victory over the Spanish fleet in the Philippines. Before noon that mood was shattered by an explosion that shook the Winter Quarters No. 4 underground coal operation and sent invisible clouds of toxic gases through the interconnected workings of Winter Quarters No. 1. In all, 200 miners were killed in what one Salt Lake City newspaper described as "death's awful harvest at Winter Quarters." The first part of this article, which appeared in the last issue of Mine Safety & Health, described events leading up to the explosion and the early efforts of the Pleasant Valley Coal Co. to locate survivors and recover victims. In the conclusion to this article, the author recounts the continued recovery efforts at the two mines and the investigators' findings regarding the causes and the origin of this terrible explosion—The Editor.

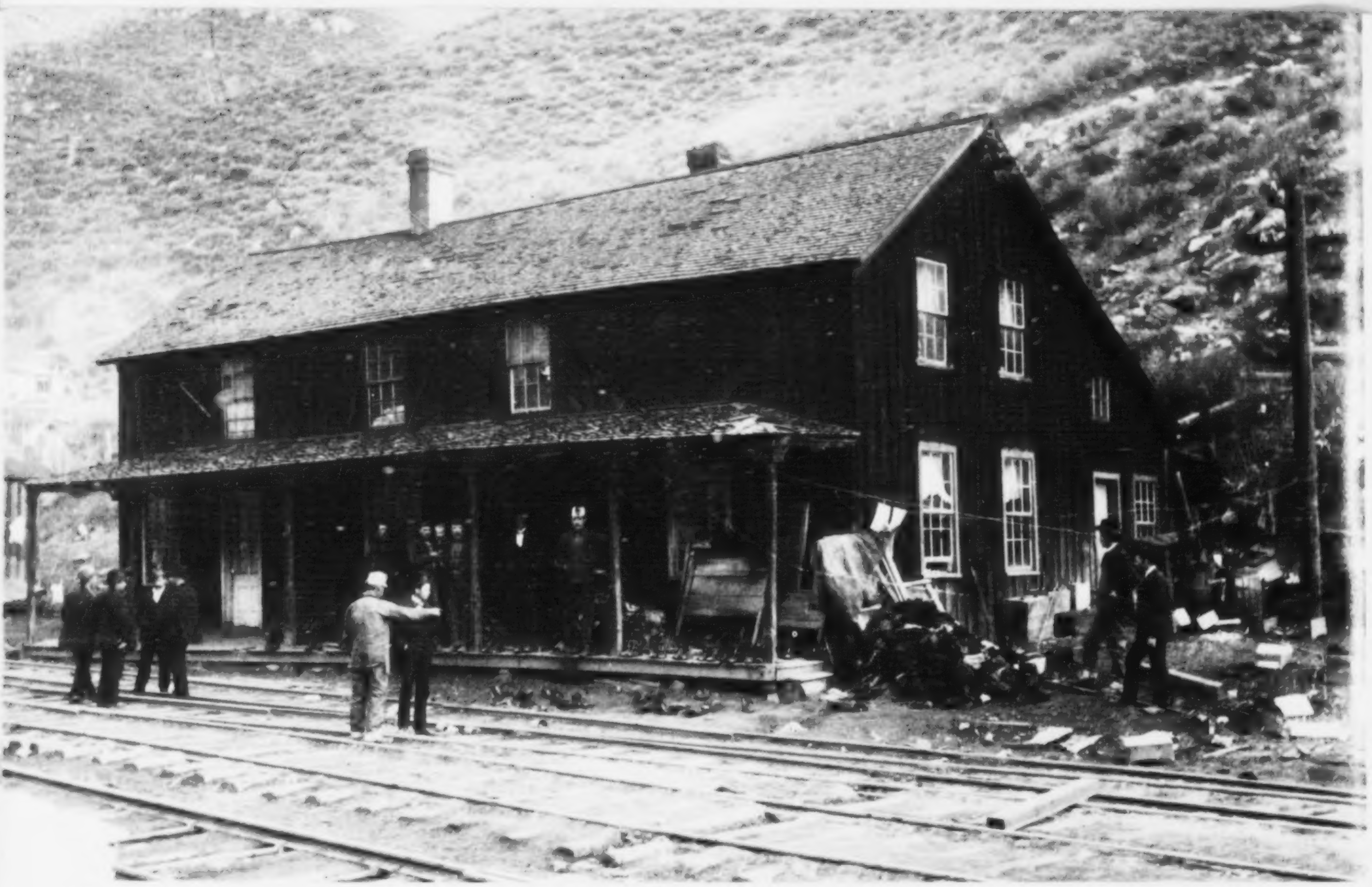
by Noel Milan

MSHA Staff Writer

After Utah became the 45th state to join the Union in 1896, the state legislature passed a law providing for a state coal mine inspector, appointed by the governor, who would be responsible for making a "careful and thorough inspection of each coal mine in the State, at least quarterly" and for reporting to the governor yearly on the state's coal mines. That same law required mine operators to provide mine maps, escapeways, adequate ventilation at specified levels and other measures to ensure the miners' safety, and it authorized the governor to order a mine closed, at the recommendation of the state inspector, when the operator refused to comply with the provisions of the law. In some situations, a mine operator convicted of violating this law could be fined from $500 to $5,000.

Utah Governor Heber M. Wells named Gomer Thomas to be state inspector in 1897, and that year Thomas' annual report had characterized the safety efforts at the Winter Quarters mines this way: "The management has provided good timbers for all purposes. . . . It has also complied with the law in other respects in providing for the safety of employees." Thomas also noted that Winter Quarters No. 1 was equipped with modern electric hoists and a large exhaust fan that provided artificial ventilation throughout the workings. "There is no gas in this mine," reported Thomas. "It is comparatively safe in regard to gases, and dust is not very dangerous, but management sprinkles traveling roads."

Several days after the disastrous explosion at the Winter Quarters mines, the town of Scofield, Utah, seen from the cemetery, awaits funeral services for miners killed in the blast. Barely visible in the foreground, right, workers prepare final resting places for many relatives and friends. The mouth of Winter Quarters Canyon can be seen in the distance, center. (George Edward Anderson photo courtesy Robert W. Edwards Collection.)



Boots and clothing of dead miners lie outside the Edwards boarding house while volunteers inside prepare the bodies for identification. (George Edward Anderson photo courtesy Robert W. Edwards Collection.)

Early Tuesday evening, May 1, 1900, Inspector Thomas arrived at the Winter Quarters mines. By then, 50 bodies had been taken from No. 4. Thomas assembled a rescue party that included W. G. Sharp, Superintendent of the Pleasant Valley Coal Co., and Castle Gate Mine Superintendent Frank Cameron and led the group into the No. 1 mine at about 8 p.m. Among the first bodies they found was that of young William Clark, who had succumbed to the afterdamp while trying to find his father and brother.

Thomas led his men down the main entry of No. 1 and up the eighth rise to the face of what was known as the No. 4 mine's Farrish level, which joined the No. 1 mine's seventh rise and which provided the shortest escape route from the deepest workings of No. 1. Two-thirds of the miners who perished in No. 1 were found at the head of the seventh rise. Not knowing where the explosion had occurred, they had run right into the afterdamp that swept down that rise following the explosion. Thomas, in his report to the governor, would later write, "There is no doubt in my mind that had these men gone down the eighth rise they would have all saved their lives, for had they gone down the eighth rise they would have encountered fresh air."

One member of Thomas' rescue party, a miner who had come to Winter Quarters from the company's Castle Gate Mine, described the scene to a reporter. "We had some hard experiences today going through the mine. Several times, members of our party were overcome by the damp, but we got them out in time. We found bodies of the men in every conceivable shape, but generally they were lying on their stomachs with their arms about their faces. The men died almost instantly when struck by the damp and did not suffer. They just became unconscious and were asphyxiated. Their faces were all calm and peaceful as though they had just fallen asleep.

"The men in No. 1 might possibly have escaped had they started to run as soon as the explosion in No. 4 . . . occurred," the miner continued, his voice tinged with sadness. "Evidently, they did not appreciate this fact until too late, as they put on their coats and arranged their tools before starting. They started, however, just in time to meet the damp halfway."

While Thomas and his men worked their way along the Farrish level, he tried vainly to understand how such a tragedy could possibly have happened. As he told a reporter that evening, the Winter Quarters mines were regarded among the most carefully managed in the West, believed to be free from firedamp (methane gas) and from dangerous quantities of coal dust. Thomas had found no dangerous conditions when he had inspected the mines about six weeks earlier. The questions that now tortured him would never be answered for certain; the only miners who knew exactly what had happened were dead. The effort to determine what had happened would consist of painstakingly piecing together telltale signs left on singed roof timbers, on the ribs and other areas, and trying to trace the origin, force and direction of the initial and possibly subsequent explosions through careful examination of displaced and sometimes demolished mine equipment and the location and condition of each victim's body.

In many cases, rescuers were forced to call upon all the inner strength they could muster when they came upon another victim. One miner described the scene this way: "When a man was caught by the full force of the explosion, he was hurled against the wall or floor with the same effect that would follow the throwing of a piece of dough against the wall."

Rescuers worked until 2:30 Wednesday morning when Superintendent Sharp sent them home for a much-needed rest. By one newspaper's account, 137 bodies had been recovered from both mines when that first intensive rescue and recovery effort ended.

Several crews resumed work early Wednesday morning as newspaper readers around the country first learned of the terrible mine accident. The *Deseret Evening News* reported a perceptible change in the mood surrounding Pleasant Valley and Winter Quarters Canyon, as so many of the houses prepared to receive their dead. "The awful scene of yesterday had passed away when the day dawned this morning, and the awful calm of despair had taken its place," the news account said. "The agonized shrieks of the widows and the moans of the fatherless were no longer heard. The stricken ones were beyond that, and their grief could find no utterance."

In some homes, the burden of grief was especially heavy. Several Scofield families lost all their male members in the explosion. In one family, Robert Hunter, his three sons and four of his nephews were dead. John James, a miner who also served as one of Carbon County's commissioners, was discovered by one of the rescue parties with his son at the spot where both were overcome by afterdamp, entwined in each other's arms. Abe Louma and his wife, who had come to Scofield from Finland only three months earlier to enjoy the prosperity of the "new" country with their sons and grandchildren, lost six sons and three grandsons in an instant. The mine camps of Scofield and Winter Quarters that had been known as married men's camps were now widows' camps.

Nearby communities also grieved. Many who worked at Winter Quarters were coal miners only during the winter months; when summer came, they returned to farms they worked throughout eastern Utah. Scores had not yet returned to their farms for the summer season.

Among the many expressions of sympathy that poured into Scofield following the disaster was one that had come to Gov. Wells from President McKinley.

As the initial shock of that Tuesday's events was replaced by full recognition, if not total acceptance, of the harsh reality of the disaster, some miners who survived the blast began to speak their minds regarding the accident. According to the *News*, some miners were "exceedingly bitter in their denunciations of the company, and others took a more conservative view of the matter and said it was one of those things over which no man has control and for which no man or men should be held responsible."

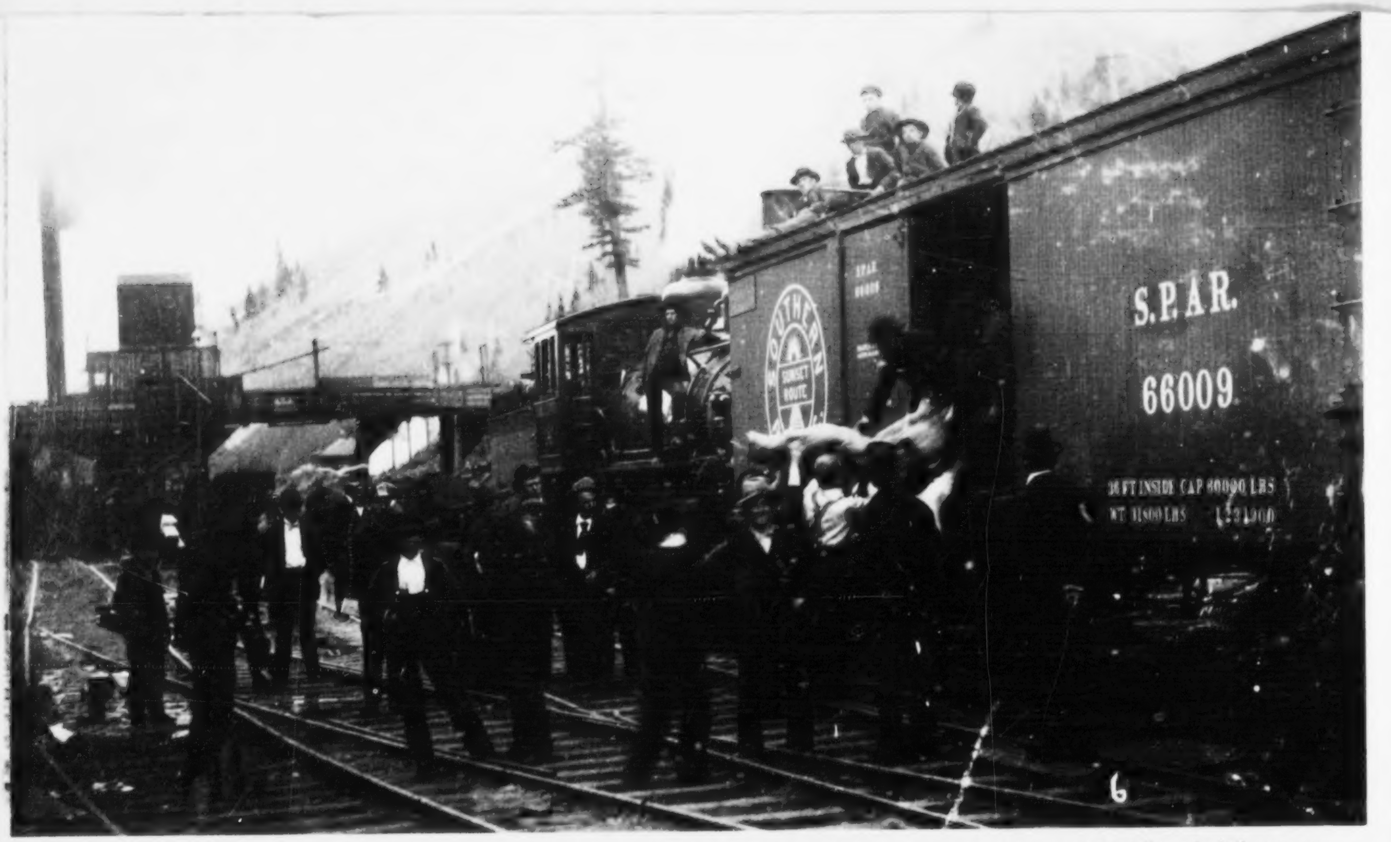
The *News* reported that Mine Superintendent Thomas J. Parmley had his own theory. He suggested that some of the Finnish miners had secretly taken some giant powder (containing nitroglycerin) down into the mine to dislodge greater bodies of coal, thus making a good showing and as much money as possible, since they were paid by the ton. Parmley thought that when the giant powder was touched off, it ignited the coal dust in the mine. His theory proved to be inaccurate when the missing sticks of giant powder were found, unexploded, in another part of the mine.

Gomer Thomas and his men continued their work Wednesday as they inched their way to No. 4 from No. 1, hanging brattice to redirect ventilation airflow, securing the mine roof as they went along the Farrish level and removing bodies as they discovered them. The work went slowly; it would take almost two weeks to examine the workings of No. 4 to an extent that the crews could be reasonably certain that all bodies had been found, but some rooms that were badly caved were left unexplored. Several weeks later, when Thomas and company officials went over the list of men thought to be in the mines at the time of the explosion, they would discover that one miner, John Pitman, had not been found. Room 12 of the Farrish level, thought to be the miner's workplace, was badly caved, and it wasn't until the end of July that it was considered safe to search the room. The location of Pitman's body in the room on Aug. 9 would raise the accident's toll to 200.

Late Wednesday, the day after the explosion, Thomas reached the area of No. 4 known as "Pike's Peak," just off the main-back entry at an intersection with the as yet undeveloped third level. The state inspector soon found evidence that suggested that the explosion had been touched off near that point. The body of a miner found nearby had been more severely burned than that of any of the other victims, and remnants of 10 kegs of exploded black powder littered the immediate vicinity. Another 20 kegs of black powder had exploded in nearby parts of the mine, adding to the force of the explosion.

In his formal report to the governor, Thomas later reconstructed what he thought had happened in Winter

Shortly after James Naylor, left, and Evan Williams escaped through the No. 1 portal, Williams re-entered the mine with a rescue party and found two friends who had succumbed to smoke and hot, toxic gases resulting from the explosion. Barely alive when Williams reached them, they died in his arms soon afterward. (George Edward Anderson photo courtesy Robert W. Edwards Collection.)



When the boarding house could no longer accommodate the growing number of dead, the washed and wrapped bodies of victims were taken by boxcar down the canyon to Scofield and held there in several public buildings where undertakers prepared them for burial. (George Edward Anderson photo courtesy Robert W. Edwards Colection.)

Quarters No. 4 that Tuesday morning. "It seems, from the evidence available, that some person accidently ignited a keg of powder, which caused the dust to rise and ignited the same, carrying the flames from a point known as 'Pike's Peak' and immediate vicinity thereof. . . .

"Along the line where the powder exploded, all the bodies were badly burned, more so than in any other part of the mine. From this point, the blast shot down along the main and main-back entries of No. 4 mine, gathering combustibles, such as dust, powder, etc., within reach. Part of the blast shot out to the surface through No. 4 tunnel and air shaft, and part went through No. 1 mine. The part of the blast that went into No. 1 mine soon lost its force. . . ."

Thomas' first opportunity to explain his findings publicly came at the coroner's inquest held in Scofield on Thursday, at which a number of witnesses expressed anger and bitterness. Thomas defended the mine owners, noting that the Pleasant Valley Coal Co. had recently hired its own inspector who had inspected the No. 4 mine just a few days before the explosion. Thomas described for the coroner's jury what he had seen at "Pike's Peak," and related the story in language described by the *Salt Lake Tribune* as "stronger than words."

Many miners said they would never work underground again.

"No, I do not want any coal mining here or anywhere else, in fact, for some time to come," one man told a reporter. "I have just shipped my partner, Peter Sutherland, whom I came West with, to his home in Canyon City, Colo., and when that last act was completed, I threw up the hunt for the victims for fear that I would become mentally unbalanced. It was an experience that I would not care to go through again, even if death was the penalty for a refusal to do so."

In almost all the homes along Winter Quarters Canyon and on the streets of Scofield, families kept vigil over the bodies of their loved ones. Tumbledown shacks, box houses and log cabins held one or more coffins surrounded by now fatherless families. A reporter, noticing the many unfinished houses under construction, wrote, "The awful calamity has stopped all work, and it will be months before they are completed, if ever they are."

Passengers on the northbound Rio Grande Western that morning were murmuring among themselves about the state's dreadful news when the train slowed for its scheduled stop in Colton. Many craned their necks to watch the five coffins that were loaded on the train and the grieving woman who also boarded the train at the station. She seemed to be no more than 18 years old. A nervous quiet settled over the passengers as they rode to Thistle, but when the train stopped and the coffins were taken from the train for the last leg of their journey homeward, the woman became hysterical. She had sufficient reason. Four of those five coffins carried the bodies of her father, John Muir, her two brothers, George and Dan Muir, and her husband of three months, Gunner Bjornson.

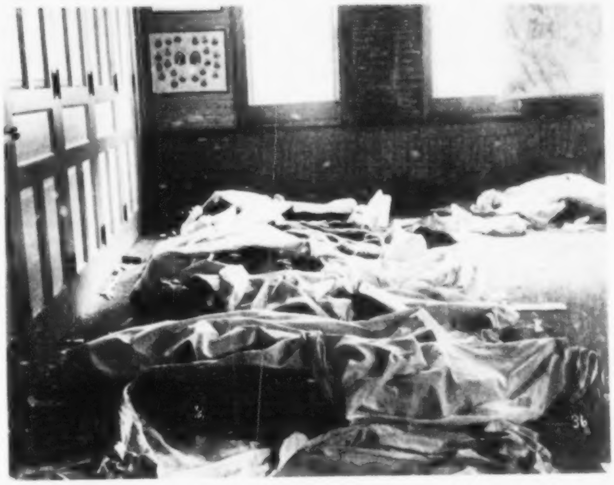
On Friday morning, Utahns were startled to read a statement in the *Salt Lake Herald* attributed to Gomer Thomas in which he allegedly accused the Pleasant Valley Coal Co. of negligence that contributed to the explosion.

Later that day, Inspector Thomas gave the competing *Tribune* a signed statement, carried in Saturday's paper, charging that the statement printed by the *Herald* was false. "I am not prepared to make any statement as to where the blame should lay and will not, until further investigation is made."

Three more bodies were recovered from rooms off the Farrish level in the No. 4 mine by the continuing shifts of recovery work. Funeral trains carried the remains of 55 victims to nearly a dozen towns and cities in Utah and Colorado. The others awaited services planned for Saturday in Scofield.

The company had provided each of the dead miners with a casket and a suit of burial clothes. It also absolved families of the victims of debts accumulated at the company store during April. In addition to the $20,000 the company contributed to the relief fund shortly after the explosion, the company offered $500 to the heirs of each man killed, and most readily accepted the company's offer, in lieu of all claims for further damages. The relief fund would amass more than $200,000 from sources that included the company, communities, individuals and benefit events.

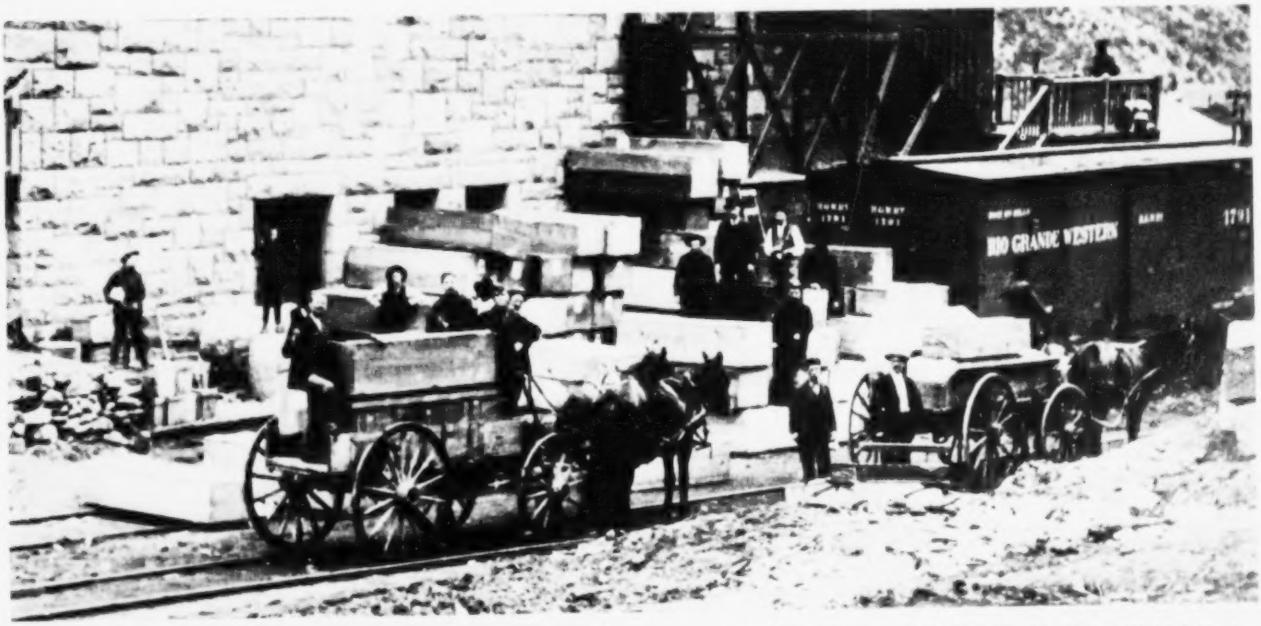
On Saturday, two funeral services were held. The first service was conducted by Rev. Granholm, a Finnish Lutheran minister who had come from Rock Springs, Wyo., for 61 Finnish miners, and a second was held by several Mormon apostles for the remaining victims who were to be buried at Scofield. Graves were adorned with flowers sent from Salt Lake City, since spring flowers were in short supply near Scofield. Mourners who lingered at the gravesites after the services were driven from the cemetery in the early evening by strong winds and torrents of rain.



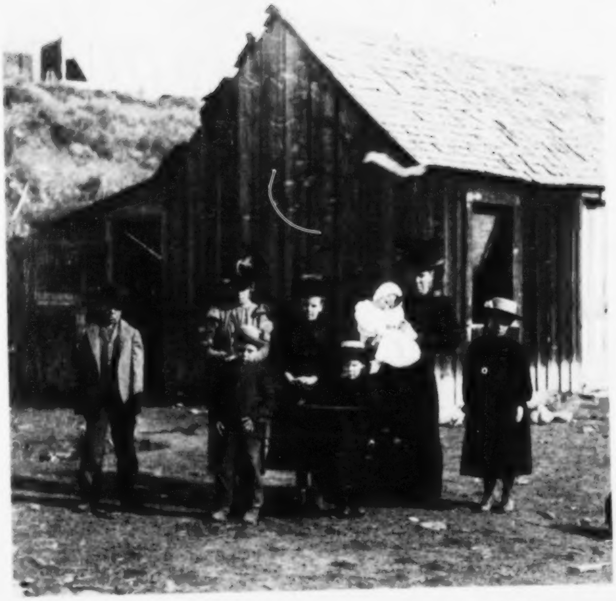
Some of the 62 explosion victims carried into Scofield lie under sheets in a schoolroom in which children had taken part in a May Day celebration only the day before. (George Edward Anderson photo courtesy Robert W. Edwards Collection.)

Six weeks after the explosion, a Carbon County grand jury heard testimony on the Winter Quarters disaster, and on June 13, they issued their terse report: "We fail to find any criminal neglect or carelessness on the part of the owner of the mine in which said disaster occurred or on the part of anyone else."

For some residents of the communities in northwest Carbon County, the psychological wounds would fester for their lifetimes. Some families of victims later had to be forcibly removed from company houses they had occupied until the time of the explosion, and some miners



Workers at the Wasatch company store distribute some of the 100 coffins ordered from Denver. Only 125 coffins were available after the explosion, and local carpenters worked quickly to provide more. Part of the Denver shipment was later returned. (George Edward Anderson photo courtesy Robert W. Edwards Collection.)



Mrs. John T. Jones and her now fatherless children wait for a wagon to take them to the Mormon burial service held four days after the explosion. Earlier that day, another service was held for 61 Finnish miners who had perished underground. (George Edward Anderson photo courtesy Robert W. Edwards Collection.)

who stayed on continued to grumble about conditions and staged an unsuccessful strike in January 1901.

Despite the scars that would last for years, life slowly returned to normal in the affected communities, and many miners who had sworn that they would give up mining forever returned to the Winter Quarters mines. "That is a peculiarity of coal miners the world over," said one miner who had survived an explosion five years earlier in Almy, Wyo. "Every man who survived that explosion vowed he would never go into that mine again. I was one of the loudest, and yet, after the shock had worn off, I was about the first to accept work and return to the mine."

One of the men hired to fill vacancies created by the explosion was Daniel Harrington, a young engineer who had just earned his degree from the Colorado School of Mines in Golden. Harrington worked in the company's mines for many years before joining the Federal Bureau of Mines in 1914. While with the Bureau, he authored or co-authored more than 300 bulletins, circulars, reports and articles. At the time of his retirement in 1948, he had served for more than 15 years as chief of the Bureau's health and safety branch.

When the Bureau received a query in 1936 concerning the Scofield disaster, Harrington responded in a letter that drew upon his earliest experiences as a mining engineer. "What actually happened insofar as could be learned," he wrote, "was that two men, wearing the old-time oil lamps, were making up some cartridges of black blasting powder at a point in their workroom where they had at least three, and probably more, 25-pound kegs of black blasting powder available. Presumably on making up the charge, the flame of their open light in some way or other came in contact with the granular black blasting powder and the explosion was precipitated with the resultant loss of 200 lives and the wrecking of the mine in which the explosion occurred. This mine was not re-opened for nearly 10 years after the explosion." Harrington concurred with other published accounts that these mines were absolutely not gassy. "The Scofield explosion was unquestionably one started by black blasting powder," he continued, "and the only ingredient entering into it was coal dust."

At the time of the explosion, the potentially explosive nature of coal dust was not fully understood. Gomer Thomas, however, made clear in his report that he was now convinced of the devastating potential of concentrations of airborne dust.

"This explosion," he wrote, "was either due to carelessness in handling of explosives or to a windy or blown-out shot, thus igniting the dust, in air free from firedamp (methane). . . . Here we have proof that an explosion can take place without the presence of firedamp under these conditions."

As one miner told a reporter almost two weeks after the blast, "The explosion has taught Utah a lesson, but the cost of it has been terrible." As the years passed, there were other mining disasters that exacted terrible human tolls elsewhere in the United States. One woman who had lost her husband in the Winter Quarters tragedy would be widowed yet again when an explosion and mine fire killed 172 miners at the nearby Castle Gate Mine on March 8, 1924. This second major Utah mine disaster stunned the townspeople of Helper and sharply revived painful memories among Scofield residents.

Those who survived those days at Winter Quarters would never forget. Folklorist LaVerne Stallings reported in 1954 that her search for a ballad about the Scofield disaster had led her to John Beddoes, then 93, who barely escaped serious injury outside the portal of No. 4. She remarked about his memory for history and mining songs. "He spoke freely of the event," she wrote, "which was still so vivid in his mind that his voice shook and tears rolled down his cheeks as he told how the tragedy had struck almost every family in Scofield."

The wound had been freshly opened.

Update

MSHA Jurisdiction Shifts to OSHA at Certain Mine Sites

An appropriations measure enacted by the Congress in December has shifted jurisdiction over certain mining activities from MSHA to the Occupational Safety and Health Administration (OSHA).

The continuing resolution that provides funding for certain federal agencies through March 31, 1982, contains a "rider" that prohibits MSHA from using funds to enforce its regulations governing the surface mining or milling of stone, clay, colloidal phosphate and sand and gravel. The measure also provides that none of the appropriated funds be used to enforce the regulations covering independent contractors engaged in construction in areas separate from actual mining activities. It further prohibits MSHA from using any funds to enforce its rules at mines owned or operated by any state or the political subdivision of any state. Additionally, the resolution prohibits MSHA from classifying any potash mine as "gassy" using air sampling methods outlined in the current regulations.

The effect of the wording of the continuing resolution is to shift responsibility for worker health and safety at certain mining, milling and construction sites from MSHA to OSHA. Effective Dec. 16, 1981, OSHA assumed responsibility for responding to worker safety and health complaints, imminent danger situations and fatalities occurring at worksites affected by the shift in jurisdiction. OSHA has also formed a task force to examine scheduled inspection activity, standards, jurisdictional issues and the impact on state-run occupational safety and health programs.

Because of the continuing resolution's prohibitions, MSHA has furloughed approximately 220 metal and nonmetal enforcement and assessments personnel at over 40 MSHA offices around the country. Field offices in Mankato, Minn., San Juan, P.R., Fairfield, Ohio, and Watertown, S.D., will close for the duration of the furlough, which will run from Jan. 4 to March 31, 1982.

MSHA has ceased making inspections of the affected operations, will issue them no citations, and will assess no penalties against them for the duration of the prohibition. OSHA, however, will issue citations and propose penalties, as appropriate, following its inspections.

Changes in MSHA's Structure Discussed At Academy Meeting

Changes in MSHA's organizational structure aimed at making more effective use of agency resources recently were discussed at a meeting of MSHA headquarters and field officials held at the Mine Health and Safety Academy at Beckley, W.Va.

Assistant Secretary of Labor for Mine Safety and Health Ford B. Ford addressed MSHA district and subdistrict managers and responded to questions on aspects of the reorganization of several functional activities.

Last November, Ford announced plans to improve the agency's field organization, primarily by expanding and strengthening the role of each MSHA district manager. MSHA presently enforces standards under the Federal Mine Safety and Health Act of 1977 through 10 district offices in the Nation's coal fields and six district offices nationwide with safety and health responsibilities in the metal and nonmetal mining industry.

Citing the special familiarity of district and subdistrict managers with local mining personnel and conditions, Ford said that those responsible MSHA managers at the field office levels are best equipped to work with their counterparts in mine management and with officials of union locals toward achieving safety goals, and that district managers are being given several important tools for improving cooperative working relationships with other parties in the mine safety equation.

When the reorganization has been completed, Ford said, each district manager will have total safety and health management authority and responsibilities in his area of jurisdiction and will have the tools to flexibly provide the mining community with a wide array of services in addition to his present responsibilities for enforcement and the provision of certain technical assistance.

Among other important changes, the district manager will have responsibility for reviewing and approving operators' programs of safety and health training of miners. In the past, this function has been the responsibility of training administrators at 10 training centers located throughout the country. The district managers already approve other plans which the 1977 Act requires mine operators to submit such as mine ventilation and roof control plans.

Development and distribution of education and training courses will be handled by the National Mine Health and Safety Academy.

The assistant secretary said that, in the future, specialists whose sole responsibility is education and training will be assigned fulltime to the district managers' staffs, which already include a variety of engineers and technicians. Mine inspectors also will be expected to advise operators on correcting hazards with further training, as appropriate.

Also,part of the district manager's expanded role will be the responsibility for holding conferences with mine operators and miners' representatives when requested to do so to discuss facts related to the issuing of citations for alleged violations.

The conference process is now administered by conference specialists in separate offices throughout the country. Under the reorganization, MSHA's assessments office in Wilkes Barre, Pa., will issue proposed assessments after MSHA inspectors issue citations and the mine operator and miners' representatives have had an opportunity for a complete health and safety conference with the district managers or their designees.

Both at the meeting at the Academy and in a later speech before members of the National Limestone Institute, Assistant Secretary Ford said that the MSHA district managers' "unique familiarity" with their local situations should be a distinct asset to the agency as the district managers assume their new training and conference responsibilities.

More Rescue Team Agreements Between States, MSHA Signed

Four more states have now signed cooperative agreements with the Mine Safety and Health Administration for the inspection and monitoring of their state-maintained mine rescue stations. They are Tennessee, Illinois, West Virginia and Ohio. Earlier, the state of Kentucky signed such an agreement.

Under MSHA's mine-rescue team rules which became effective on July 11, 1981, the operator of each underground mine must either establish mine rescue teams or enter into an agreement for mine rescue services. Underground mine operators are responsible for establishing two mine rescue teams, each comprised of five members and one alternate, or arranging for these services to be available in an emergency.

Minimum requirements for mine rescue teams were established in 1980 by MSHA. Areas covered by the requirements are: team size and availability; rescue equipment; storage and maintenance; rescue team notification plans; team member experience; physical examination and training records.

Each state has agreed to allow MSHA to inspect the station, examine the equipment and storage conditions and check the records of team members' training and equipment maintenance. MSHA then reports their findings to state officials so that unsafe conditions or practices can be remedied promptly.

State mine rescue stations are inspected by MSHA representatives when they are first opened and then once every six months thereafter.

Hearings on MSHA's Civil Penalty Rules Scheduled at 3 Sites

Public hearings on proposed revisions to MSHA's civil penalty rules are being held during February in Pennsylvania, Missouri and Utah. The hearings are being conducted in response to requests received from the mining community on the revised penalty rules that were proposed on Nov. 7, 1980.

Each hearing has been scheduled to start at 9 a.m. local time at the following locations: Feb. 23—Pittsburgh, Pa., Bureau of Mines Auditorium, 4800 Forbes Ave.; Feb. 24—St. Louis, Mo., Bel Air Hilton Hotel, Gallery Room, 333 Washington Ave.; and Feb. 26—Salt Lake City, Utah, Salt Palace, 100 South West Temple, Room 128.

The proposed rules are intended to provide fair and equitable procedures for applying the statutory criteria in determining proposed penalties for violations, and to maximize incentives for operator compilance and correction of violations.

Minimum penalty assessment and provisions for awarding credit for good faith abatement of violations are among the issues in the proposed civil penalty rules included for discussion.

MSHA officials conduct such hearings in an informal manner, beginning each session with an opening statement and answering any relevant questions. An opportunity to present oral testimony is then given to the public. MSHA will also accept written comments in addition to those previously submitted and other appropriate responses from any interested parties, including those not presenting oral statements. Written comments and data submitted to MSHA will be included in the rulemaking record, which will remain open until March 5, 1982 to allow for the submission of any post-hearing comments.

The final rules developed from this rulemaking process will be applicable to any mine operator who is cited for a violation of a mandatory health or safety standard or other provisions of the Federal Mine Safety and Health Act of 1977 and appear as Title 30, Code of Federal Regulations, Part 100.

Further information is available by contacting Pat Silvey at MSHA's Office of Standards, Regulations and Variances in Arlington, Va. Phone: (703) 235-1910.

The Notice of Public Hearings was published in the Federal Register on Friday, Jan. 15, 1982.

Legal Briefs in Mining

Ronald Roberts v. United States, Civil Action No. 79-49, decided Dec. 30, 1981.

The plaintiff alleged that, on June 1, 1978, John Rouba, an MSHA mine inspector, had negligently and unlawfully ordered him to use explosives to remove an overburden of rock and clay from one of the walls of a slate quarry operated by Roberts at South Poultney, Vt.

According to Roberts, he followed Rouba's orders, which included specific instructions on how and where to blast, and the blast destroyed the quarry.

The administrative law judge found "no conflict in the evidence that the slate collar and the clay soil it held constituted a danger to workers in the pit," and that "all agreed that the peril had to be removed in the interest of safety." However, the court concluded that, although Rouba and Roberts had discussed alternative methods of solving the problem, "the decision as to how the overburden would be removed was left to Roberts and his chief quarryman.

News and Notes

The judge found that, "since Rouba was not a participant in selection of the method for correcting the dangerous condition and did not engage in the blasting operation," MSHA was not liable to the plaintiff for the outcome, as alleged.

Johnny Howard v. Martin-Marietta Corp., FMSHRC Docket No. SE 80-24-DM, final order Sept. 9, 1981.

A miner was discharged for leaving the work area to call for an inspection of a front-end loader allegedly with faulty brakes and for refusing to stay and help repair it.

Administrative law judge James Broderick ruled that the operator violated Section 105(c)(1) of the Federal Mine Safety and Health Act and ordered him to pay the employee the sum of $7,171.55 as back pay with interest. Based on testimony at the hearing, the judge noted, the parties "agreed that the brakes were often faulty," and found that Howard had been "fired for requesting a safety inspection," an activity protected under the Act.

United Mine Workers of America, Local Union 1374, District 28 v. Beatrice Pocahontas Co., FMSHRC Docket No. VA 80-167-C, final order Oct. 6, 1981.

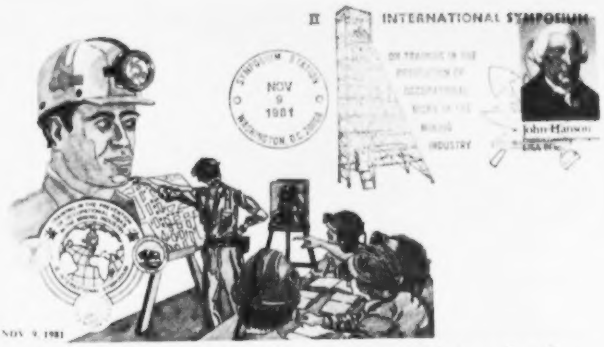
On June 8, 1980, an MSHA inspector issued a withdrawal order to the company due to the accumulation of explosive concentrations of methane gas in the bleeder entries of the No. 3 longwall of the Beatrice Mine. The miners scheduled to work the next shift reported to work and were requested to remain on the surface until it was determined whether the order would be terminated. They were sent home about an hour and a half after being at work and received four hours pay for the day.

The UMWA claimed that its members were entitled to four hours of pay under Section 111 of the Act plus four hours pay under terms of the National Bituminous Coal Wage Agreement of 1978 requiring miners to be paid for four hours if they could report to work but were not able to work their shift. The operator's position was that no reference should be made to the UMWA's contention that the four hours of compensation were paid under the agreement.

The administrative law judge found that the operator "could have easily removed itself from its present predicament by notifying the miners when it became apparent that the order would not be terminated on the next working shift." The operator was ordered to pay each miner on that shift four hours of compensation in addition to the four hours already paid under the agreement, with interest.

Recent Additions to the MSHA Library

- **IR 1133—Injury Experience in Coal Mining, 1980,** by Staff, Division of Mining Information Systems, 335 pp., 57 Tables, 3 Figs.
- **IR 1134—Injury Experience in Stone Mining, 1980,** by Staff, Division of Mining Information Systems, 400 pp., 23 Tables, 3 Figs.



A special postal commemoration of the recent International Symposium on mine safety training containing a special Washington, D.C. cancellation is now available. These color covers can be obtained by sending a self-addressed, stamped envelope with a check or money order for $1.50 apiece or $3.50 for three covers to: MSHA, 4800 Forbes Ave., Pittsburgh, Pa. 15213—Attention Janet Earhart.

- **IR 1135—Injury Experience in Nonmetallic Mineral Mining (Except Stone and Coal),** 1980, by Staff, Division of Mining Information Systems, 271 pp., 23 Tables, 3 Figs.
- **1136—Injury Experience in Sand and Gravel Mining, 1980,** by Staff, Division of Mining Information Systems, 86 pp., 19 Tables, 3 Figs.

Here's How to Obtain Reports and Films

Single copies of Information Reports are available through:

MSHA, Office of Information
4015 Wilson Blvd., Rm. 1237A
Ballston Tower No. 3
Arlington, Va. 22203

Films can be borrowed from the National Distribution Center in Pittsburgh, Pa. Send all requests to:

Motion Pictures
MSHA
4800 Forbes Ave.
Pittsburgh, Pa. 15213

Films can be purchased by directing requests to:

Chief, Division of Audio Visual Services
MSHA, Education and Training
4800 Forbes Ave.
Pittsburgh, Pa. 15213

- **IR 1137—Injury Experience in Metallic Mineral Mining, 1980,** by Staff, Division of Mining Information Systems, 231 pp., 23 Tables, 3 Figs.

These five informational reports review in detail the occupational injury and illness experience of U.S. mining industries during 1980. Data on work injuries, reported by mine operators under the requirements of 30 CFR Part 50, are summarized by work location, type of accident, part of body injured, nature of injury, victim's occupation and kind of mineral. Correlative information is presented on worktime, employment and—for coal—production. Each publication also has two tables that summarize injuries reported for the mining industry as a whole.

- **The Jefferson Island Mine Inundation: Report of Mine Inundation, Jefferson Island Mine, Diamond Crystal Salt Company, New Iberia, Iberia Parish, Louisiana, November 20, 1980,** by Marvin W. Nichols, et al., 146 pp., 32 Appendices.

This report covers MSHA's investigation of the incident that attracted national attention last year when the Jefferson Island salt mine was flooded by the overlying Lake Peigneur. The entire lake drained into the mine, carrying with it several barges and an oil company drill rig and causing extensive damage to neighboring property; prompt evacuation of the mine, however, prevented injury or loss of life.

The report, previously available only in photocopied form, includes background histories of the mine and drilling operation, describes the inundation and the emergency procedures that were followed, details MSHA's engineering evaluations to determine the cause, and includes recommendations for preventing similar accidents. The investigation team was not able to determine the exact cause of the flooding, but three possibilities are identified. The appendices contain copies of official documents, maps, engineering findings, photographs and other information pertinent to the investigation.

- **Annual Report of the Secretary of Labor Under the Federal Mine Safety and Health Act of 1977, Fiscal Year 1979: Volume 1,** 83 pp., 38 Tables, 7 Figs.

This report covers MSHA's activities in enforcement, rulemaking, assessment of civil penalties, technical and engineering work, and education and training in fiscal year 1979. It also includes information on the mine safety and health activities of the Labor Department's Office of the Solicitor and the independent Federal Mine Safety and Health Review Commission. Volume 2 describes mine health and safety research activities by the Interior Department's Bureau of Mines, and is available from that agency.

Miniature Television Camera Used to Probe Roof Stability

A miniature black and white television camera about twice the size of a large cigar is being evaluated by MSHA technical support specialists in Denver, Colo., as a potentially valuable drill hole probe for analyzing roof conditions in underground mines. Originally developed by the Westinghouse Corp. for the inspection of interior components in nuclear reactors, the television "boroscope" system has already generated considerable interest among mining industry officials, according to Ed Hollop, chief of the MSHA Technical Support ground control branch in Denver.

Tested earlier this year in an underground Michigan copper mine, the hermetically sealed one-and-a-quarter inch by one-foot-long camera is equipped with a self-contained light source and is hooked by a 30-foot cable into a television monitor and remote control unit capable of adjusting focus and light intensity. The camera head can be fitted with a 16 mm lens that has a 38 degree field of view, a "fisheye" type lens with a 180-degree field of view, and a right angle prism viewfinder. The entire system is powered by a 12 volt rechargable battery pack designed especially for MSHA for underground use.

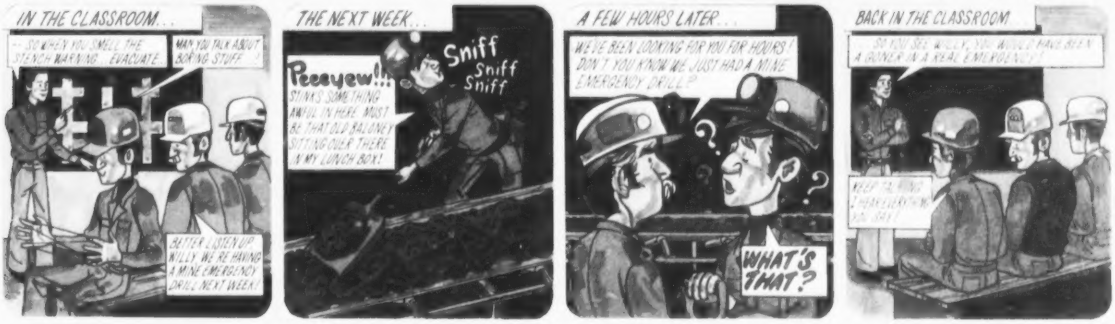
Hollop believes the boroscope has several advantages over existing methods to determine defects in mine roof structures. In efforts to determine roof bolt types, lengths and spacing patterns, ground control specialists currently use a rigid optical rod device or "stratascope" to peer up into test roof bolt holes in search of hidden faults, cracks and other discontinuities. Similar in ways to a periscope, this instrument is pushed up into the hole in increments and observations are recorded on a drill hole "map" by a second observer. One major drawback is that as the battery powered light on the end of the long rod is extended up the hole, the fading light and decreasing image size often make it difficult to get an accurate measurement of true conditions.

With the television system, specialists first lodge a spring-loaded clip at the top of the hole through which a wire is threaded that can be attached to the camera. The clear, adequately illuminated view of the hole can then be videotaped as the camera is slowly hoisted upwards, providing observers with a crisp record for analysis on site or back in the lab. An engineer's measuring tape attached to the cable gives an accurate representation of camera position. A big advantage of the system, Hollop said, is that any number of observers can view the results simultaneously and can make comparisons of individual interpretations of the conditions observed. Among other potential uses, Hollop added, the boroscope could be used for regular shaft inspections, viewing the interiors of ball mills and crushers, and for communicating with miners trapped underground.—**Mary Gerdes.**

Focus

Lumps 'N' Chunks

Drawn by C. P. Knox

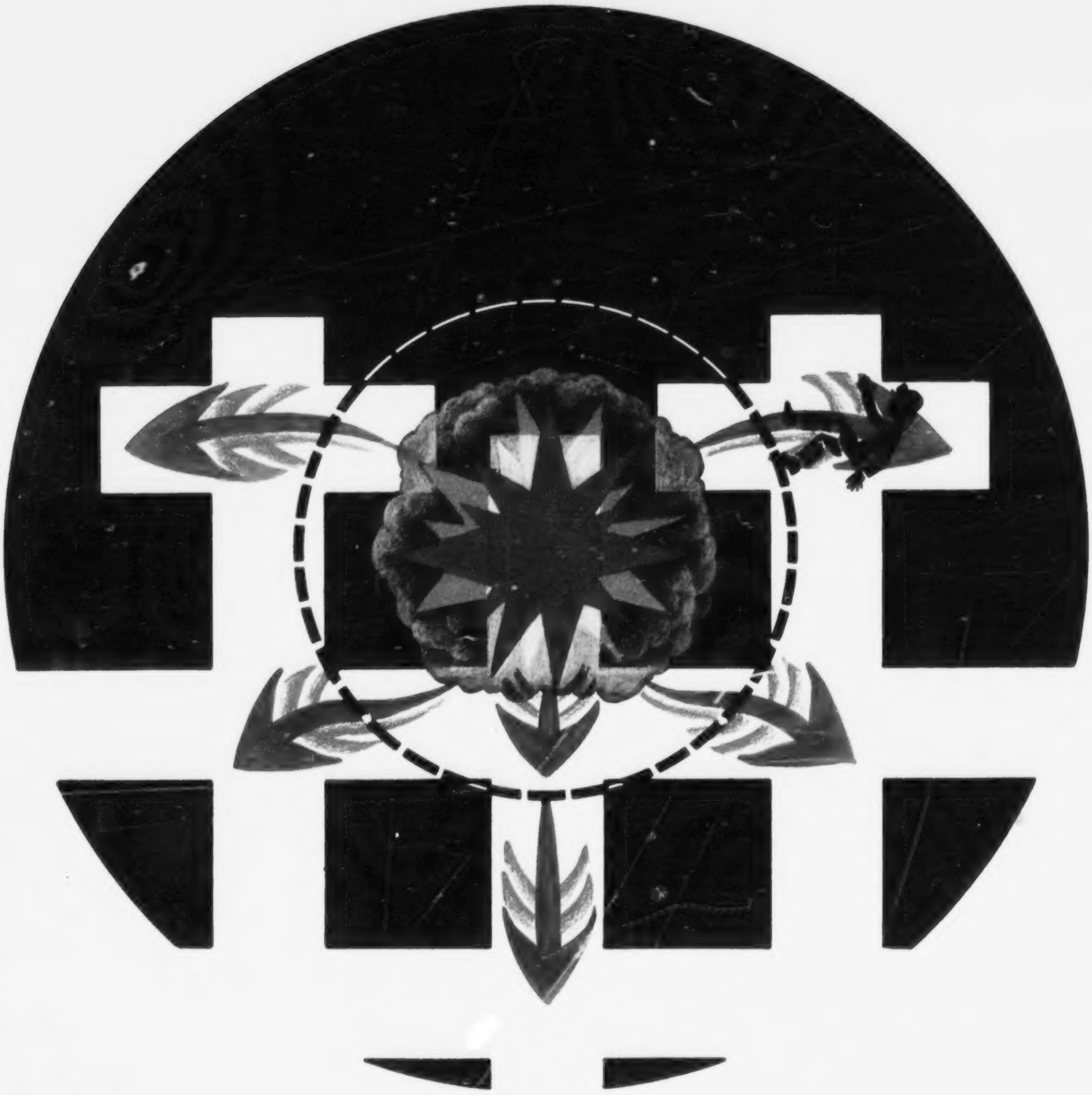

IN THE CLASSROOM...
-- SO WHEN YOU SMELL THE STENCH WARNING... EVACUATE.
MAN YOU TALK ABOUT BORING STUFF!
BETTER LISTEN UP WILLY WE'RE HAVING A MINE EMERGENCY DRILL NEXT WEEK!
THE NEXT WEEK...
Peeeyew!!! STINKS SOMETHING AWFUL IN HERE. MUST BE THAT OLD BALONEY SITTING OVER THERE IN MY LUNCH BOX!
Sniff Sniff Sniff
A FEW HOURS LATER...
WE'VE BEEN LOOKING FOR YOU FOR HOURS! DON'T YOU KNOW WE JUST HAD A MINE EMERGENCY DRILL?
WHAT'S THAT?
BACK IN THE CLASSROOM
... SO YOU SEE WILLY, YOU WOULD HAVE BEEN A GONER IN A REAL EMERGENCY!
KEEP TALKING I HEAR EVERYTHING YOU SAY!

Stamp of Approval

The following equipment has been recently added to the Mine Safety and Health Administration's list of permissible or approved equipment:

- **Model 565 "Load-A-Tram" Battery Hauler,** 128 volt, direct current with one (1) 30/35/40 or 45 HP traction motor, and one (1) 7½ or 10 HP pump motor, issued to Eimco-Elkhorn, Monroe, N.C.;
- **Model 15CM Remote Control Continuous Miner,** 440/550 volt, 3 phase, 60 hertz, alternating current with two (2) 90 HP or 100 HP cutter motors, one (1) 50 HP conveyor/gathering head motor, one (1) 50 HP or 35 HP pump motor and four (4) 30/15 dual HP or two (2) 40 HP and two (2) 30/15 dual HP traction motors, issued to Joy Mining Machinery Div., Joy Manufacturing Co., Franklin, Pa.;
- **Model AMF 270-H Mine Fan,** 460 volt, 3 phase, 60 hertz, alternating current, with two (2) 30 HP motors, issued to the Spendrup Fan Co., Grand Junction, Colo.;
- **Longwall Mining System,** 480/950 volt, 3 phase, 60 hertz, alternating current, with one (1) 300 HP, two (2) 221 HP (165 KW), two (2) 175 HP, three (3) 30 HP, and one (1) 6 HP (4.5 KW) 950 VAC, (2 max.) 75 HP, 480 VAC, and one (1) 23 KW, 500 VDC motors, issued to Mining Progress, Inc., Charleston, W.Va.;
- **Longwall Mining System,** 950 volt, 3 phase, 60 hertz, alternating current; with one (1) 500 HP, two (2) 200 HP, two (2) 150 HP, and two (2) 100 HP, 950 VAC motors, issued to Dowty Corp., Cranberry Industrial Park, Zelienople, Pa.;
- **Model MS-43 Battery Tractor,** 128 volt, direct current, with one (1) HP pump motor and one (1) 20 HP tram motor, issued to Epling Manufacturing Co., Grundy, Va.;
- **Model P-AST-12 Series 102 Battery Utility Tractor,** 128 volt, direct current, with one (1) 40 HP traction motor and one (1) 10 HP pump motor, issued to Kersey Manufacturing Co., Bluefield, Va.;
- **Model 12CM Continuous Miner,** 950 volt, 3 phase, 60/50 hertz, alternating current, with two (2) 175/135/125/110/95 HP, 60 hertz or 115/120/110/75 HP, 50 hertz cutter motors, one (1) 70/65 HP, 60 hertz or 60 HP, 50 hertz conveyor motor, one (1) 50 HP, 50 or 60 hertz pump motor and two (2) 35 HP, 250 VDC traction motors, issued to Joy Manufacturing Co., Franklin, Pa.;
- **Model 14CM Continuous Miner,** 950 volt, 3 phase, 60/50 hertz, alternating current, with two (2) 175/135 HP, 60 hertz or 155 HP, 50 hertz cutter motors, one (1) 50 HP, 60/50 hertz pump motor, one (1) 70/50 HP, 60 hertz or 60/45 HP, 50 hertz conveyor-gathering head motor, two (2) 35 HP, 250 VDC traction motors and one (1) 60 hertz only 30 HP, dust collecting motor, issued to Joy Manufacturing Co., Franklin, Pa.;
- **Longwall Mining System,** 950 volt, 3 phase, 60 hertz, alternating current, with one (1) 300 KW, two (2) 200 HP, two (2) 150 HP, and two (2) 40 HP, 950 VAC motors, issued to Consolidation Coal Co., Fairmont Operations, Fairmont, W.Va.;
- **Bendix P/N 7010000-1 and P/N 7010000-2 30-Minute,** open-circuit, pressure demand type self-contained breathing apparatus, issued to the Bendix Corp., Largo, Fla.;
- **Globe Model No. 2840-W Positive Pressure,** open-circuit, 30-minute self-contained breathing apparatus, issued to Glove Safety Products, Dayton, Ohio;
- **W-344 Powered Air Purifying Respirator,** issued to 3M Co., St. Paul, Minn.;
- **10003S and 10003M Disposable Half Mask Respirators,** issued to Norton, Co., Safety Products Div., Cranston, R.I.;
- **10002S and 10003M Half Mask Disposable Respirators,** issued to Norton Co., Cranston, R.I.;
- **10041S and 10041M disposable Half Mask Respirators,** issued to Norton Co., Cranston, R.I.;
- **Dura-Vent #6569 Yellow Fabric for use as Brattice Cloth,** issued to Duracote Corp., Ravenna, Ohio;
- **Dura-Vent 6509 Yellow Fabric,** issued to Duracote Corp., Ravena, Ohio;
- **Dura-Vent 6599 Yellow Fabric,** issued to Duracote Corp., Ravenna, Ohio;
- **Dura-Vent 6594 Clear Fabric,** issued to Duracote Corp., Ravenna, Ohio;
- **JMD Nylotex Standard Yellow Fabric,** issued to Johnston-Morehouse-Dickey Co., Bethel Park, Pa.;
- **JMD Nylotex Medium Yellow Fabric,** issued to Johnston-Morehouse-Dickey Co., Bethel Park, Pa.;
- **JMD Nylotex 40 oz Clear Fabric,** issued to Johnston-Morehouse-Dickey Co., Bethel Park, Pa.;
- **JMD 6Y Plastic and JMD 15Y Plastic for use as Brattice Cloth,** issued to Johnston-Morehouse-Dickey Co., Bethel Park, Pa.;
- **JMD Jutex Fabric for use as Brattice Cloth,** issued to Johnston-Morehouse-Dickey Co., Bethel Park, Pa.;
- **House Cover Compound NN89P026 for Hydraulic Hose Cover and Tubes,** issued to Goodyear Tire and Rubber Co., Akron, Ohio;
- **Compound 101 for Water Discharge Hose Cover,** issued to Kuraray Plastics Co., Ltd., Fukiishima-Ku, Osaka, Japan;
- **Series 180 AR Rock Dust Hose,** issued to Kanaflex Corp., Compton, Calif.;
- **Chempet FRE Hydraulic Fluid,** issued to Chempet Corp., Addison, Ill.;
- **Kutwell 40 (Concentrate) Hydraulic Fluid,** issued to Exxon Co., Houston, Texas

The poster on the following page is designed to encourage miners to observe and work toward improved safety practices. The poster, which was created by Art Director Columbus P. Knox, can be cut out of this issue and placed on bulletin boards or at other locations regularly passed by working miners.



WARNING!

Be doubly sure all areas are clear and guarded before blasting...

Pikeville Grads Have Excellent Safety Record

Pikeville College, a small, two-year institution in eastern Kentucky, has been achieving top honors in mine safety since the inception of its mine technologist program in 1971. Graduates of the program, which began with partial funding provided by the "Assistance to States" section of the 1969 Coal Act and has continued under an MSHA state grant, have been earning the kind of grades that count—low injury statistics.

Last summer the college conducted a telephone survey of all its graduate mine technologists and found that 91 percent were currently employed in the mining industry. Even more impressive was the discovery that the graduates' combined incidence rate for nonfatal accidents with days lost in the years 1977 through 1979 was 2.2 per 200,000 employee-hours, well below the national average of 7.97 for all coal mining in the same years.

In the four years previous to this period, when the Federal government collected data on mining accidents using the American National Standards Institute's method of recordkeeping, the rate of nonfatal disabling accidents among Pikeville's mine technologists was also quite low: 1.6 for every 200,000 employee-hours, as compared to the nationwide average for coal mining of 6.84. And, the College noted proudly, there had not been a single fatal accident among the graduates of the program.

Department chairman Dr. Maurice Bailey credits his graduates' exemplary safety record to the program's unique focus. "Mine safety," he said, "is the principal objective." While the curriculum contains traditional academic subjects such as mathematics, science, and communications, the main emphasis is on the study of mine safety and health laws and standards and mine technology.

On campus, students gain hands-on experience using the program's own mining instruments and materials, including methane detectors, anemometers, mine rescue devices, and first aid kits. Students also serve internships in the mining industry during the summer months, with the faculty monitoring their performance.

Graduates of the mine technologist program receive an associate's degree in mine technology and can elect to continue studies towards a bachelor of science through a special arrangement with the University of Kentucky. The course work that Pikeville's mine technologists complete also fulfills MSHA's requirements for 40- and 24-hour safety and health training for underground and surface miners.

Recently, Pikeville College began offering a 90-hour program of instruction for mine electricians. Individuals who finish the program, compile one year's experience and pass the Federal examination become MSHA-certified mine electricians. Bailey said that 70 percent of those who completed the program have passed MSHA's examination.

Stacking conveyors carrying varied gradations of crushed and screened rock to stockpiles. The fast-moving delivery system provides customers with any size of aggregate or a desired blend of any of seven sizes of rock ranging from coarse to fine.

Rinker (Continued from Page 7)

Audio visual aids are an important part of the safety training program. For years, the company had used a film projector in the central office for general task training, but had no audio visual equipment or facilities specifically for safety training. When the safety training program began, M. E. Rinker, Sr. approved the spending of more than $2,000 for film and slide projectors, training films and other safety training equipment and materials. Mader, a wartime combat photographer, takes many photos at the Hialeah operations for use in safety slide shows.

Although supervisors and employees of the FEC Quarry were awarded the Sentinels of Safety trophy for 1980, personnel of the SCL and Rinker Lake Quarries consider the safety programs at their operations equally praiseworthy.

By late 1980, employees of the SCL Quarry had compiled a record of 1,055 consecutive days worked without a lost-time injury. The record was broken when a worker cut his finger in a minor mishap. SCL Quarry employees then began compiling a new record which, as of last December, had reached nearly a calendar year without a disabling injury. For the past year, Bob Johnson has been general production superintendent at the SCL Quarry. His immediate predecessor was Tom Deaner, now head of the mobile equipment field maintenance crew.

At the Rinker Lake Quarry, there is considerable pride in the quarry's imaginative equipment guarding program which was completed about a year ago under the direction of Red Liston, general operations superintendent, and Tom Tarantino, production and maintenance superintendent.

The program required redesigning and rebuilding of all guards at machinery pinch points, lubrication points and other potentially hazardous areas. The renovation has been so successful that inspection personnel have described it as the best guarding they have ever seen.

Bulky, heavy guards that had previously been bolted into place have been replaced by smaller sectioned guards which are hooked together to enclose machinery areas as large or larger than those protected by the old guards. Grease fittings have been extended so that maintenance workers no longer have to go around the head pulley to lubricate conveyor points. The new custom-made guard sections are lightweight but strongly built, and are much easier and less time-consuming to remove and replace during equipment maintenance and repair than the old guards were. A similar guarding program at the FEC Quarry is now half completed.

"Safety is number one here," Liston said, and he and Tarantino strictly enforce all rules on wearing personal protective equipment, working around conveyors, driving and maintaining mobile equipment, and other requirements.

"I don't mind scaring my people a little," Liston said. "If you've ever seen a guy wrapped around a head pulley with only a red shirt and part of a pair of pants sticking out of the machinery, as I have, you never forget it. It's not a pretty sight, and I don't hold anything back. I tell them how nasty it can be."

Following their shifts at the Rinker Lake and other quarries, equipment operators turn in reports listing any mechanical or electrical problems they have noticed, and maintenance logs are kept showing the defects and the repairs that have been made. Vehicle brakes receive special attention, and brakes are cleaned daily when the operators work in muddy areas.

There is some chagrin at Rinker Lake that the quarry's otherwise spotless safety record during Fiscal 1981 was marred by one lost-time injury, a sprained back suffered by a worker during a trailer hitching incident. Both Liston and Tarantino believe that the accident could have been prevented if the victim had followed safe lifting precautions.

Tarantino, who was active on the management-labor safety committee when it was first formed, recalled, "We're pretty proud of what we've done here. There was a lot wrong when we first started our weekly inspections. We checked everything, guards, rollers, pinch points, pulleys, ladders . . . We corrected what we could do right away and some of it took longer. We went from more than 120 violations down to zero violations."

He added, "Safety has priority from the top company people on down. When we first set up the management-labor safety committee, Madar really pushed hard to get the violations corrected. He would write you up for any violation. Everybody wanted to catch him missing something, but he didn't miss much. We've worked closely with Mader on this program. Ken Hoganson (the division's general manager) is 100 percent behind the safety program. He's not bashful about reminding any supervisor or employee about our safety shortcomings."

Tarantino conducts separate safety meetings for the production and maintenance crews, and often discusses safe work procedures with his four work crew lead men.

James Corrigan, a dragline lead man who also has been active on the safety committee, said, "Three or four years ago, nobody talked much about safety, but we're very fussy about accident prevention these days. Most of our people look out for each other without being told. The safety attitude here is fantastic."

Mader, rather than the safety committee, now makes most of the intensive weekly inspections of the plant and files reports on the conditions he finds.

"We began using the committee less as physical conditions at the operation steadily improved," Mader explained. "The results of the committee's work since it had been formed had been excellent, and the serious engineering violations we had earlier had been corrected. We're shifting the emphasis now to employee participation in equipment operator training programs. We are using a lot of audio visual operator training materials, including materials developed by MSHA."

The Rinker Materials Co. has a sophisticated system of investigating and analyzing accidents that occur at its four divisions.

"Detailed written reports are prepared and sent to me on all serious or potentially serious accidents," said Frank Eaton, the company's risk manager at the West Palm Beach office. "These are based on an in-depth investigation by the front-line supervisor and are subject to approval by the next two levels of supervision.

"We emphasize teamwork in investigating accidents and preparing reports. We go beyond the bare facts. What we want to know is what went wrong with the system. Why wasn't a man wearing personal protective equipment? Why was he using a hazardous procedure? What should we be doing to keep the same thing from happening again?

"Our accident analysis system forces us to do the things we should have been doing all along. I review all of the reports. If a report is too vague about the specific actions we should take, we go back and rewrite it until everybody at the different levels of supervision is satisfied as to what has to be done to prevent a reoccurrence."

In September 1981, at the suggestion of Ken Hoganson, all aggregates division production and maintenance superintendents began attending monthly meetings devoted solely to safety. Before that time, accident prevention had been only one of many topics discussed at meetings Hoganson held with the superintendents.

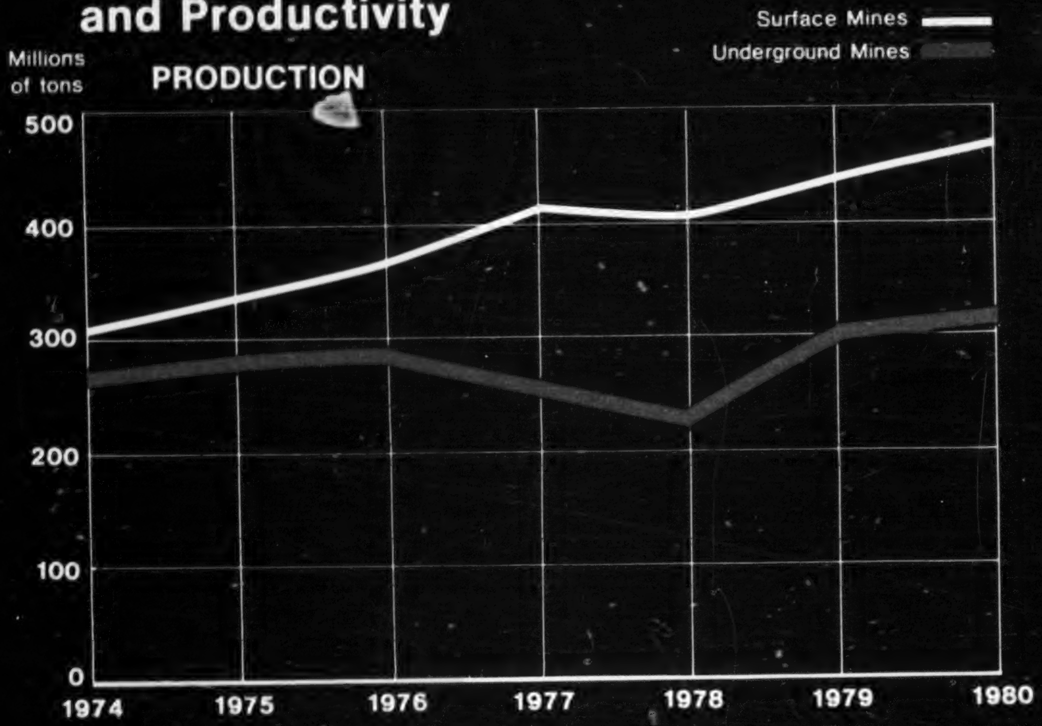
"Don Mader has responsibility for recapping the month's safety activities, and we get safety feedback from all areas of the division," Hoganson said.

"The superintendents go over accident and injury investigations in their responsibility areas for the previous month, the times and places where they occurred, and the status and trend of worker's compensation insurance medical costs, and we deal with any current safety problems that may come up. The superintendents use some of this material in safety meetings with their people."

Hoganson, like other officials at the Rinker Southeastern Materials Co., sees no basic conflict between safety and production goals of the company. Production has remained high since 1979 while the savings in medical costs of accidents, less production downtime and the retention of healthy, skilled workers have greatly outweighed the expense of the safety program.

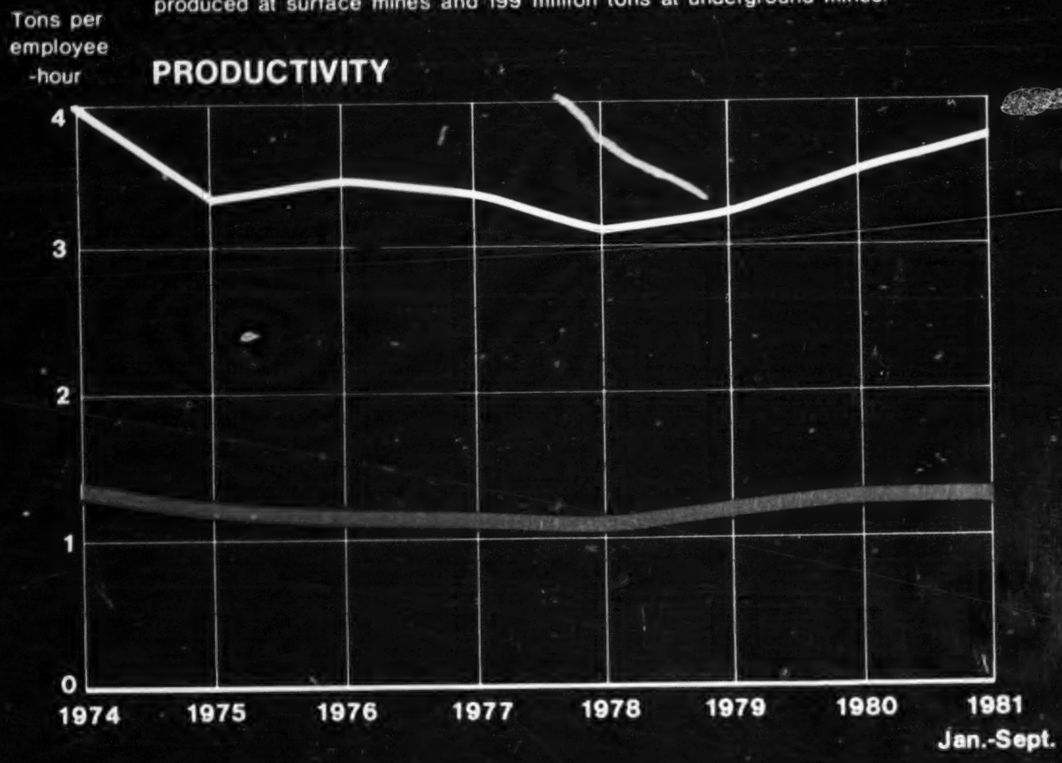
"We don't want to see our people hurt and that alone justifies the program," Hoganson said. "But if you're talking strictly dollar costs, everybody here will tell you that safety doesn't cost you money, it makes you money."

Recent Trends in U.S. Coal Mine Production and Productivity



PRODUCTION

Preliminary figures indicate that in Jan-Sept. 1981, 343 million tons were produced at surface mines and 199 million tons at underground mines.



PRODUCTIVITY

UNITED STATES
GOVERNMENT PRINTING OFFICE
Superintendent of Documents
Washington, D.C. 20402

Official Business

Postage and Fees Paid
U.S. Department of Labor

Third Class Mail

Lab-441

For the Latest in Mine Safety Training Technology...

Subscribe to Mine Safety and Health....

Subscription Order Form

Enter my subscription to Mine Safety and Health @ $14.00. Add $3.50 for foreign handling. No additional charge for mailing within the United States and its possessions. For shipment to foreign countries include additional postage as quoted.

Please print

Name — First, Last

Company Name or additional address line

Street address

City **State** **Zip code**

☐ Remittance Enclosed
(Make checks payable to
Superintendent of Documents)

Mail Order Form to:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

7/4

Mine Safety & Health

U.S. Department of Labor
Mine Safety and Health
Administration

Fall 1982

New MSHA Structure--P. 2
Mine Rescue Section--P. 10

L 38.9:

What They're Saying...

"We had no food or water much. There was 42 of us, and only five dinner pails. The first day, we had one biscuit around. That was the end of our food supply. So the men picked up scraps where men had eaten their lunch...some took strips out of egg shells. Some went so far as to eat leather on their shoes...or bark on chestnut mine timbers."
—William Derenge, 91, recalling a 1915 explosion in the Layland mine in West Virginia that killed 119 miners and for a time trapped him and 41 co-workers.

"It is not our intention to take over any mine, but we insist on the right of our members to a safe workplace. In the 1970s, we realized that, if the coal industry is to make any progress, we have to sit down and talk together."
—Jerry Jones, United Mine Workers of America, District 12, staff member, speaking at a conference at Southern Illinois University.

"There must be a public commitment and understanding that safety is as important a value to uphold as is producing coal at the lowest cost per ton."
—Sen. Jennings Randolph, D.-W. Va., addressing the Institute on Coal Mining Health, Safety and Research, at Virginia Tech, Blacksburg, Va.

"What we have done over the past 10 years is merely spend money in the name of safety because we are legally obligated to...(but in taking part in the current review of regulations)...we must accept the fact that a meaningful and permanent safety program cannot be achieved in an adversarial atmosphere...Without a genuine, wholehearted, cooperative effort by all parties, all the rules, regulations, citations and penalties in the world are not going to be effective."
—R.M. Holsten, president, Pittsburgh and Midway Coal Mining Co., also speaking at the Blacksburg, Va., coal conference.

"That was the last thing I remember telling them...I seen it start to fall. I hollered, and one boy was standing right against me. Best I remember, I took my hand and shoved him 'caused rock was sliding, was coming from over there...where I was standing..."
—Employee of a Virginia mine at which a man died in a roof fall.

"...A company's compliance with prescribed safety standards will not by itself produce an outstanding safety record. The initiative...to achieve excellent safety must come from the managements of coal companies. They alone have the authority...to establish policies and priorities (and) ...to implement safety programs, commit resources, and reward their managers and employees for achieving the (safety) goals..."
—"Toward Safer Underground Coal Mines," a report by the National Academy of Sciences' National Research Council, based on an analysis of deaths and injuries in coal mining.

"We've had problems before getting people to help us in prosecutions. The people who worked there suddenly lose their memories. They forget who paid them, who signed their checks..., (but) citizens now are helping us."
—Willard Stanley, commissioner of Kentucky's Department of Mines and Minerals, discussing state raids made on small, illegal "wildcat" or "bootleg" coal mines.

NEWARK PUBLIC LIBRARY
NOV 9
U. S. GOVT. PUBS.
DEPOSITORY 376

Mine Safety & Health

U.S. Department of Labor
Mine Safety and Health
Administration

Fall 1982

Page 4

Page 18

Page 30

Contents

Cover
The cover illustration by Art Director Columbus Knox shows an inspector using an anemometer to take an air velocity reading in a mine passageway.
Inside front cover
What They're Saying...
2 **Better Training, Communications Are Key Aims of MSHA Changes**
10 **Mine Rescue Section**
Part I--The Day Dutch Creek Blew Up
Part II--A Special Breed of Miner
Part III--Going Down a Smoking 'Cannon Barrel'
22 **Safety at Rockland Rests With Foremen**
29 **Safety Poster**
30 **Update Section...events, new technology, safety cartoon**
Inside back cover
Chart: Coal Mine Injury Rates Down in First Half of 1982

United States Department of Labor
Fall 1982 issue, Volume 7, No. 4

Mine Safety and Health magazine is published by the Office of Information of the Mine Safety and Health Administration four times a year.

Mine Safety and Health magazine is for sale by the Superintendent of Documents, $6.00 annual subscription; $10.00 annual foreign subscription. When ordering copies specify: Mine Safety and Health.

Send payment to: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Please do not send subscriptions to MSHA.

Editorial communications should be addressed to the Editor, Mine Safety and Health magazine, 4015 Wilson Blvd., Rm. 604, Ballston Tower No. 3, Arlington, Va. 22203.

Material may be reprinted without permission of the editor or the agency; however, the magazine must be credited as the source of material.

The Secretary of Labor has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through March 31, 1985.

Expressions of opinion in articles outside the U.S. Department of Labor do not necessarily represent the views of the Department.

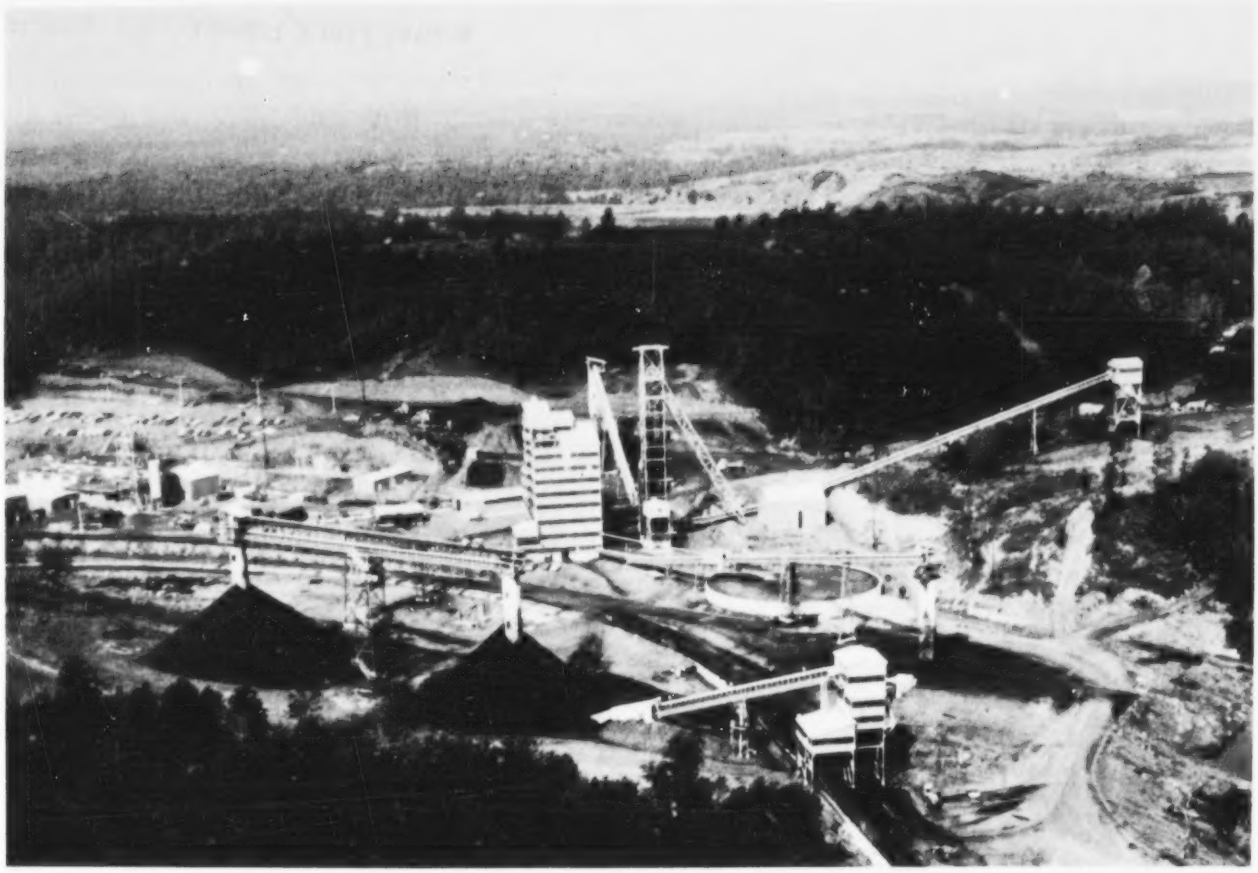
Change of Address: Write to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Raymond J. Donovan, Secretary
United States Department of Labor

Ford B. Ford, Assistant Secretary
Mine Safety and Health

Wayne E. Veneman, Chief
MSHA, Office of Information

Samuel Stafford, Editor; Columbus Knox, Art Director; Sharon Maines, Editorial Assistant; Fred Bigio, Graphics Consultant. Photos with article on MSHA reorganization by Gene Rapp, Mary Gerdes and from files; photos with Mine Rescue Section articles by MSHA staff and the Rocky Mountain News, Denver, with maps and other artwork by Columbus Knox; photos with Rockland Mine article and mine rescue contest article by Sam Stafford; photo with article on the all-industry conference at the Mine Health and Safety Academy by Gene Rapp.



Each mine presents unique conditions and unique health and safety needs. With new responsibilities for training and for health and safety conferences under a recent agency reorganization, MSHA's field managers can better tailor to each mine's needs.

Field Managers' Roles Expanded

Better Training, Communications Are Key Aims of MSHA Changes

By Katharine Snyder
MSHA Staff Writer

The Mine Safety and Health Administration has recently emerged from a major reorganization designed to improve coordination in the use of agency resources, to target resources where they are needed most, and to encourage efforts by industry and labor to assume their full responsibilities for miners' safety and health. Announced in November 1981 and effective this May, the reorganization gave responsibilities for education and training and for conferences on cited violations to MSHA's district managers, providing them with additional tools for solving safety and health problems.

By the end of August, the new procedures had begun to work with relatively few hitches as inspectors, managers, specialists, mine operators and miners' representatives became thoroughly accustomed to new procedures and new responsibilities. Some details are still being refined, and MSHA headquarters officials are closely monitoring the districts' experience with their new functions.

The decision to reorganize MSHA was one of the first actions of President Reagan's appointee to the post of assistant secretary of labor for mine safety and health, Ford B. Ford, who was confirmed by the Senate Oct. 26, 1981.

"Soon after the President selected me to direct the Mine Safety and Health Administration and before I came East to assume these responsibilities, I began an intensive study of the agency, its mission, and its overall structure," Ford told a meeting of the National Limestone Institute in January 1982. "One concern that I had almost immediately, was that our field officials—the district and subdistrict managers—do not have all the tools they need to combat injuries and illnesses at the mine site.

"The 1977 Act gave MSHA a broad range of enforcement, engineering and education and training measures to improve safety and health conditions, but currently, the district manager has for his immediate use only one kind—enforcement. Separate lines of authority from MSHA headquarters to the field limit the district manager from using more than enforcement and certain kinds of technical assistance to improve safety and health conditions at the mines in his jurisdiction."

On Nov. 12, 1981, Ford announced a series of changes to be made in MSHA's field structure to remedy this situation and to improve the agency's effectiveness in other respects as well. Ford's plan called for redistributing functions of two MSHA activities which had been acting in the field with relative independence, and placing these functions under the agency's district organizations.

Behind the changes was the perception that MSHA's field managers lacked important tools needed to combat mine injuries and illnesses.

MSHA has 10 Coal Mine Safety and Health districts and six Metal and Nonmetal Mine Safety and Health districts. Before the reorganization, the main responsibility of the district managers was to enforce health and safety regulations in their geographic areas. Although districts also provided a limited amount of consultation and technical assistance to operators, the emphasis was on inspections.

When an inspector wrote a citation for a violation, however, as soon as the violation had been corrected the citation was sent to MSHA's Office of Assessments, an arm of the agency independent of the district organizations. The Office of Assessments proposed a penalty to be paid for the violation.

At that point, the mine operator could request a conference with an assessments conference officer. These officials, stationed at nine conference offices around the country, had the authority to change the amount of the proposed penalty if the information presented by the operator warranted. Inspectors did not take part in assessment conferences, and conference officers could not modify or vacate the actual citation. Inspectors and their supervisors were seldom informed of issues raised in the conferences.

Another arm of MSHA with considerable field activity prior to the reorganization was the Directorate of Education and Training. Its 10 training centers were also independent of the districts; their duties included approving mine operators' plans for providing miner training as the law requires, certifying instructors, monitoring training programs for effectiveness, and other responsibilities.

The relative independence of inspection, conference and training activities sometimes made coordination difficult, and mine operators had to deal with three different arms of MSHA on different aspects of safety and health.

By handing over conference and training functions to the district managers, the reorganization provided the district manager with additional means of solving safety and health problems, gave each district greater autonomy, and reduced administrative complications. By transferring job positions from the assessments field offices and training centers to the districts, the reorganization also provided the district managers with additional personnel to carry out their full range of responsibilities.

"You should no longer be perceived in your own minds and hopefully in the minds of the mining community as MSHA's chief enforcement officers," Ford told the MSHA district managers when he met with them at MSHA's National Mine Health and Safety Academy at Beckley, W.Va., to discuss the reorganization. "Instead you are to be MSHA's chief health and safety managers in the field."

After the decision to reorganize, several months were required to work out details, issue related regulations, carry out personnel actions, close assessment offices and training centers and prepare the districts for their new responsibilities. Officially, the reorganization was completed in May. Since then, Assistant Secretary Ford and his staff have closely monitored the districts' experience.

Of the reorganization's two aspects—conferences and training—the conference aspect has been most fully implemented, and its results appear easiest to assess at this stage.

Besides placing conferences on cited violations in the district manager's sphere of responsibility, another important change in conferences was made in the reorganization: the opportunity to discuss the citation with an MSHA official now comes *before* any penalty is proposed. As Ford explained at an April meeting of the California Mining Association, ". . . the focus shifts from the question of the amount of the fine to the more important issue of the validity of the citation and of what must be done to ensure healthy and safe working conditions for the miner . . ."

Now, if an operator receives a citation for a health or safety violation, and is not satisfied by discussing it with the inspector at the closeout conference held after every inspection, then the operator has 10 days to ask the district manager for a conference (called a "health and safety conference" to distinguish it from the closeout).

The district manager may hold this conference personally or delegate it to the subdistrict manager or field office supervisor; the conference may be in person or held by phone. The miners' representative has an opportunity to participate in any conference requested by management and also the right to

James Krese, district manager, Coal Mine Safety and Health, at MSHA's Mount Hope, W. Va. office, discusses safety and health training activities at area mines with MSHA training specialist Jennifer Underwood, who recently was assigned to the Mount Hope office.

initially request a conference. Only after any health and safety conference is the citation forwarded to the Office of Assessments for a penalty to be proposed.

MSHA no longer holds conferences on proposed penalties, but the operator still has the right to contest any proposed penalty before the Federal Mine Safety and Health Review Commission.

Coordinated with the new conference process are revised regulations on civil penalty procedures that MSHA issued last May. The regulations incorporated the new conference system and contained other revisions intended to concentrate efforts by MSHA and mine operators on correcting significant safety and health hazards. MSHA held intensive discussions with members of Congress, labor and industry leaders, and others leading to implementation of the regulations.

MSHA had used a penalty point system for all routine assessments since civil penalty regulations were first issued under the Federal Mine Safety and Health Act of 1977. The system was designed to incorporate six criteria that the Act requires to be considered in penalty assessments: the size of the operator's business, the history of previous violations, negligence, gravity of the violation, good faith in correcting the violation, and the penalty's effect on the operator's ability to continue in business.

Under the earlier assessment regulations, each of the first five criteria was assigned a scale of points which were totaled, then translated into a dollar amount using a penalty conversion table. The penalty might be reduced if the operator submitted information on the last criterion.

When these civil penalty regulations were issued in 1978, MSHA promised to review them after a time. This review was already under way when the reorganization was announced; revisions had been proposed in November 1980, and the agency had been evaluating comments from the public. On Jan. 15, 1982, MSHA announced public hearings on the proposed changes.

MSHA held the hearings in February and the final regulation, which incorporated public comments and brought the rules into line with the reorganization, was issued May 21, 1982.

Besides the new conference process, perhaps the most significant changes in the new rule were the introduction of a $20 "single penalty" for nonserious violations and allowance of greater credit for good faith in correcting a violation.

The $20 penalty may be imposed "where the violation is not reasonably likely to result in a reasonably serious injury or illness, and is abated within the time set by the inspector," the regulation states.

The criterion of "reasonably likely to result in a reasonably serious injury or illness" corresponds to the definition of a "significant and substantial" violation established by a 1981 decision of the Federal Mine Safety and Health Review Commission. The 1977 Act requires strong enforcement actions when significant and substantial violations result from a mine operator's unwarrantable failure to comply with regulations, or when a mine has a pattern of significant and substantial violations; in addition, only significant and substantial violations become part of a mine's violations history.

"MSHA developed this provision to permit the mining community to focus its resources on those violations which have the greatest impact on miner safety and health," the preamble to the regulation stated. ". . . If the hazard is not abated within the time set by the inspector, the violation will not be eligible for the $20 single penalty . . . In addition, unabated nonserious violations will subject mine operators to more stringent enforcement sanctions. . . ."

Another significant change in the civil penalty rules was a 30 percent reduction in the civil penalty when a violation is abated within the time set by the inspector. Under the earlier regulations, there was no reduction in the penalty for "normal good faith," although reductions of up to 10 penalty points could be made for "special efforts to insure abatement."

"The good faith criterion is the principle mechanism within the civil penalty formula for recognizing abatement," the preamble to the rule stated, "and MSHA believes that this revision encourages the early correction of hazardous conditions." As of Aug. 31, according to Lawrence Beeman, MSHA's director of assessments, 95 percent of formula-type assessments since the new regulation took effect were for violations that had been corrected within the time allowed. This fact seems to indicate that most operators are correcting violations promptly.

Additional changes were made by the new rule in other penalty point scales to further encourage operators to correct more serious hazards. As before, violations of such a nature or seriousness that the formula system would not yield a suitable penalty receive "special assessments" outside the formula system.

Another administrative change coordinated with the reorganization and new civil penalty rules was the design of a new citation form, which clearly shows all the factors in the inspector's evaluation that are used in determining the proposed penalty.

The inspector checks off blocks on this form to indicate whether the violation was significant and substantial, the gravity of the violation, the degree of negligence and whether the violation was abated within the time allowed. The gravity criterion consists of three factors: the likelihood of an injury or illness resulting from the violation, the probable severity of such an injury, and the number of people affected. The assessments office computes the mine size and history criteria from automated records. The operator's being able to see immediately how the inspector has evaluated each violation facilitates discussion both during the closeout conference and during any health and safety conference that may later be held.

The mining community has by now gained substantial experience with the new citation, conference and assessments procedures. District managers say most mine operators have become familiar with the new system through informational meetings held in the districts or through explanations by the inspector at the mine.

During about the first three months after the reorganization, through Aug. 27, MSHA inspectors held 10,235 closeout conferences, either following inspections or during the course of inspections that required more than a week. Following these conferences 1,089 health and safety conferences were requested; 773 had been held as of Aug. 27. (The number of requests and the number held cannot be compared to determine the exact backlog because some districts "batched" multiple requests from the same operator.)

Requests for health and safety conferences differed widely in number from district to district in the first three months. In MSHA's Coal Mine Safety and Health District 4, for example, covering the southern part of West Virginia, there had been 187 requests as of Aug. 27; in District 1, covering the anthracite region of Pennsylvania, there were only 17. The Rocky Mountain District of Metal and Nonmetal Mine Safety and Health had 33 conference requests; the Southeastern District had none.

District managers cited several reasons for the variation. Economic conditions in the mineral industries, coal miners' vacation period, and the temporary exemption of some nonmetal industries from MSHA all affected the number of producing mines under MSHA jurisdiction in different districts. Closeout conferences varied in their effectiveness in resolving issues from district to district, and different companies adopted different policies on requesting health and safety conferences.

Another aspect of the early workload, managers said, is that some operators initially requested health and safety conferences simply to gain experience under the new system; such requests can be expected to decline. One district manager said he considered the conference workload "a problem now" but expressed optimism that it would eventually cease to be one.

District managers evolved various administrative mechanisms for handling the conference workload, depending on the volume of requests, the size of the district, the wishes of operators and miners' representatives, and the district's resources. Managers are using various systems for scheduling conferences. In some districts, the district manager has handled virtually all health and safety conferences personally; in others, many are delegated to subdistrict managers and field office supervisors. In some districts almost all conferences are in person; others make greater use of the telephone. In some districts, the inspector is almost always at the health and safety conferences, in others, only on an "as-needed" basis.

In every case, however, feedback to the inspector is an essential feature of the health and safety conference. If not present, the inspector is always informed of the outcome.

Said Jerry Spicer, manager of Coal Mine Safety and Health District 7, "To the maximum extent possible, I'm having the inspector sit in the conference. I explain to the

Underlying the reorganization is the concept that MSHA's district offices, familiar with local mines and mine employees, can serve safety and health needs far better than remote offices. Above, noise control is the topic of discussion at a Utah cement plant.

Most issues arising from MSHA mine inspections are resolved at mine "closeout" conferences such as this one. Under MSHA changes, operators or miners' representatives may now request further informal district-level conferences on the facts of citations.

operator that the purpose of the conference is to discuss *facts* surrounding the violation. . . . I try to have a discussion take place between the inspector and the operator, to educate both of them. . . ."

Thomas C. Lukins has not always had inspectors present at the health and safety conferences in his Western District of Metal and Nonmetal Mine Safety and Health. However, he said, "The inspector is definitely notified if he made a wrong call. It's a learning thing."

Managers say that one effect of the new health and safety conferences is greater uniformity in inspectors' writing of citations. As Spicer put it, "It's getting inspectors to apply the regulations in a professional and fair manner. The inspector is forced to think more; we have to think about each phase of the citation. . . . We're having to follow our own rules."

Another effect has been to increase the importance of closeout conferences. Ronald Keaton, manager of Coal's District 3, said, "The inspector and the operator both realize the closeout conference gives them the opportunity to settle everything at that level and it saves them time."

The district manager for Metal and Nonmetal's North Central District, Richard Vik, agreed: "Before, the inspector's statement was simply presented to the operator at the closeout conference. . . . Now the inspectors know that if they don't resolve the issues in the closeout conference they will have to be at the health and safety conference to defend it, whereas before they didn't have to do that."

Some district managers have speculated that requests for health and safety conferences will decline as closeouts become more effective. In fact, since the first weeks under the reorganization, Metal and Nonmetal Administrator Roy Bernard observed, "We've had a reduction in health and safety conference requests all across the board."

The issues most often raised at health and safety conferences have been whether a violation was "significant and substantial," the number of people affected, and the degree of negligence. "The 'S and S' status continues to be the major point of contention in the conferences both for operators and the unions," said Joseph A. Lamonica, administrator for Coal Mine Safety and Health.

Assistant Secretary Ford, the administrators for Coal and Metal/Nonmetal, and other headquarters staff have followed the conference experiences of the districts closely to determine which administrative mechanisms are working best, to detect problems arising in the field, and to resolve any unclarities or inconsistencies in policy. As another tool in maintaining national consistency, the Office of Assessments reviews each citation to be sure it is correctly written and reflects general agency practices; if there is any doubt about a citation, it is returned to the district manager for review. As Deputy Assistant Secretary Thomas J. Shepich put it, "What we are striving for is a consistency of *policy* while allowing considerable variety on specific procedures."

Although some mine operators initially expressed concern that district managers would always uphold the inspector's judgment, a substantial number of citations have been modified in conferences, and some have been vacated. Requesting a conference, however, is no guarantee of any reduction of the assessment criteria; in a few cases, district managers have increased gravity or negligence statements based on information presented in the health and safety conference.

Labor participation in health and safety conferences has varied widely from region to region. In approximately the first three months after the reorganization (through Aug. 27), miners' representatives requested 14 health and safety conferences. Labor representatives took part, however, in 209 of the conferences held, or about 27 percent. No widespread complaints from the labor sector surfaced in those three months; many district managers reported a "wait-and-see" attitude towards the new conferences on the part of unions.

Wayne Kanack, district manager of MSHA Metal and Nonmetal's South Central District, reported a positive reaction; the unions "didn't seem to have any big concerns," he said. "They seem well satisfied with the system." In Coal Mine Safety and Health District 2, said Alex O'Rourke, "Some of our (union) locals are taking more interest in inspections than ever before." Assistant Secretary Ford has stressed to top managers the importance of encouraging labor participation in closeouts and in health and safety conferences.

While it is still early, reactions in the mining community at large seem generally positive. "Operators seemed very satisfied by the outcome of the (health and safety) conferences," said Kanack. In Coal's District 3, said Ron Keaton, "Most of the comments I've heard (from companies) are favorable." Said the North Central District's Richard Vik, "I've heard very little negative comment. Most of the comments from industry, inspectors, labor, have been that it's going to be a better system."

MSHA's Ford B. Ford: "Our programs should fit the region, the industry, the mine,...the miners...This, rather than blanket, inflexible approaches... must be our goal..."

Although the district managers' new role in education and training will take longer to become fully integrated into the MSHA field office programs, it may ultimately represent an even more important change than the new conference process, district managers say. Responsibilities that district managers inherited from the training centers include the approval of mine operators' plans for providing the miner training required by law; certifying instructors to provide the required training; monitoring instructors and training programs for effectiveness; qualifying and certifying mine personnel to perform critical tasks; assisting industry with mine rescue training and rescue contests; coordinating MSHA and state training efforts; and supporting the voluntary Holmes Safety Association.

"The inspector and the operator realize that the closeout conference gives them the opportunity to settle everything at that level, and it saves them time."

To allow district managers to carry out these new responsibilities, the training specialist positions from the training centers were transferred to the districts. But this phase of the reorganization was not intended simply to transfer existing activities; it was designed to integrate training into MSHA's whole safety and health program.

To Ronald Keaton, District 3 manager, the most important single aspect of the reorganization is "the district manager's ability to use education and training people to do the things he knows are required to reduce the accident frequency rate. . . . We can put 'E and T' people in the mines where they are needed and tailor programs to individual mines."

A training specialist who is enthusiastic about integrating training into district activities is Thomas G. Kessler, formerly administrator of MSHA's Lexington, Ky., training center and now on the staff of Coal's District 7.

At the Lexington training center, "we had responsibility for MSHA health and safety training throughout the state of Kentucky, encompassing parts of three Coal districts and one Metal district," Kessler said. "Problems resulted because we weren't able to coordinate training and enforcement efforts on any particular problem." Now, "I'm on the district manager's staff, and the other education people are assigned to the field office supervisors. The (former) inspection supervisor is now a health and safety supervisor. . . .

"My responsibility is as an advisor to those supervisors when we can help them at the district level. . . . It's a big plus in that the 'E and T' person will be associated with a certain number of mines. The concept is excellent as far as I'm concerned."

District managers plan to have training specialists spending considerable time at selected mines working to improve their training programs as the district programs evolve, rather than concentrating on paperwork or classroom training. Close interaction with inspectors will be essential.

As John English, MSHA's acting director, Educational Policy and Development, said, "We have a resource we've never had before—we have the inspector who's in there on a daily basis, who can spot some of the problem areas."

"The inspector can see areas of weakness and identify needs in the area of training," said Western District manager Lukins. "The operator is more confident with someone who understands the nuts and bolts and speaks the language. I also see a closer-knit organization and improved relations with industry and labor."

A mining instructor demonstrates a hydraulic pump for students at a state vocational-technical school. Under the reorganization, MSHA district organizations are expected to establish closer working relationships with state agencies and mining schools.

Training activities were slower to start up than conferences for several reasons. Training personnel had to move to new locations and prepare for new responsibilities. District managers had to develop specific plans and priorities. In some areas, not all training positions were immediately filled. During July, 41 coal mine training specialists were at the Mine Health and Safety Academy for two weeks of training to help them work in conjunction with inspection personnel.

In most districts, as the training pace accelerates, training specialists have been reviewing mine accident records, establishing priorities for mines which will be given training attention, and visiting mine sites, often accompanying an inspector, to make contact with operators in their areas, review accident records, observe mining practices and make recommendations.

One early effort to address safety problems through training assistance was in Coal's District 7. District manager Jerry Spicer said, "Our most concerted effort so far has been with one operator out of the Harlan field office. They'd had two fatalities, and we'd been in discussions with his men about several things.

"We thought, 'Here's a good place to start.' We sat down with him and had a discussion. We said, 'We'll help you, but you've got to make a commitment too.' He agreed. We've spent a great deal of time at his mines strengthening the safety program, and we've done some instruction. That's the most significant thing we've done so far."

District personnel have also met with operators' training specialists, and have contacted state governments and educational institutions with a view to establishing cooperative programs. Said John English, "Our field people now have much closer contact with the states than they ever did before."

English's Educational Policy and Development office at MSHA headquarters now provides policy guidance on training matters to the districts. The state grants program is still administered from this office, which now also oversees the National Mine Health and Safety Academy. Development and distribution of training and audiovisual materials is being centralized at the Academy. Priorities are being set for course development efforts in conjunction with MSHA district managers, industry, labor, the Bureau of Mines, and state governments, English said.

While it is too early to look for results of the transfer of the training functions, members of the mining community seem optimistic that, once fully implemented, the change will lead to improvements; operators who have been approached generally welcomed the chance for more consultation on their safety and training programs. "The test," said District 7 manager Jerry Spicer, "is going to be 18 months from now if there's a downward trend in accidents."

Assistant Secretary Ford has repeatedly described the reorganization as one of several efforts to achieve his goals for MSHA: to improve the agency's effectiveness, establish a better fit between actual safety and health needs and agency programs, encourage labor and industry in their positive efforts for safety and health, and promote greater cooperation and interchange among all sectors of the mining community.

Other such efforts include comprehensive reviews of existing safety and health regulations, suggestions for possible legislative reform, encouragement of joint ventures in safety and health, and measures to promote greater communication among industry, labor and government, as in the joint meeting held earlier at the Mine Health and Safety Academy.

At this and many other meetings with mining groups, Ford has requested thoughtful comments on the reorganization and the above-listed activities from all groups and individuals involved in mine safety and health. He has stressed one goal—reductions in injuries and illnesses. Essential to that goal is fitting programs to local needs—the concept behind the reorganization.

"So far as possible," Ford told a West Virginia group this June, "I believe our MSHA programs should fit the region, the industry, the mine, even the miners. This, rather than blanket, inflexible approaches . . . must be our goal. . . . If we work in partnership, I am certain that we will see a real and lasting improvement in the safety and health conditions at all of our Nation's mines."

Lively workshop sessions were among the most popular parts of the informal two-day conference on improving safety and health relationships and programs. Representatives of industry, unions, government agencies and mining schools attended.

Improving Communications on Safety Is Topic of 2-Day Academy Meeting

A conference early this Summer on the theme, "Open Communcations Promote a Safer Workplace," drew a good response from all segments of the mining community.

The two-day conference at the National Mine Health and Safety Academy in Beckley, W. Va., was attended by more than 100 people representing industry, labor unions, Federal, state and local government agencies and academic institutions.

At the close of the conference, participants unanimously recommended that a national, all-industry meeting be held next year to further explore new cooperative safety initiatives and to follow up on suggested actions developed at this year's conference. MSHA also is planning to hold one or more regional joint conferences.

In opening the sessions, which included presentations, workshops and a panel discussion, Ford B. Ford, assistant secretary for mine safety and health, noted that the "common purpose" of those at Beckley is the elimination of deaths and serious injuries and illnesses from America's mines and the reduction of even minor accidents to an irreducible minimum.

Any lesser goal, he said, "is unacceptable because any preventable death, disabling injury or serious illness suffered as a result of working in the mines is unacceptable."

Commenting on the diversity of representation at the meeting and the sizeable turnout, Ford told attendees, "That is a very broad spectrum of background, expertise and interests from which to draw fresh approaches and a renewed sense of purpose in carrying out our safety mission."

Two of the main themes running through the speeches and the dialogue at later workshops were the need for better communication of useful safety and health information among all parties and the need to improve methods of getting accident prevention, technical and training materials to users in the mining community.

Other speakers from MSHA and the Bureau of Mines included Thomas Shepich, MSHA deputy assistant secretary, and John English, acting director of MSHA educational policy and development.

Shepich discussed MSHA's recent reorganization, which, among other

Continued on Page 33

Mine Rescue Section

Part I -- THE DAY DUTCH CREEK BLEW UP

By Noel Milan
MSHA Staff Writer

Their reasons for wanting to become members of mine rescue teams are as varied as their backgrounds. They are the many miners at large and small operations throughout the country who have volunteered to spend long hours—often on their own time—in rescue training on the chance that they will be needed in time of emergency.

When the unthinkable occurs, and there is a major mine fire, explosion or flood, these volunteers unhesitatingly enter underground mines under the toughest, dirtiest and most dangerous conditions imaginable to try to save any survivors, or—if the worst happens—to recover their bodies. Those who have taken part in actual rescue attempts have never forgotten the experiences.

On April 15, 1981, an explosion ripped through the Dutch Creek No. 1 underground coal mine, near Redstone, Colo. This article presents the recollections of company employees, members of four of the seven mine rescue teams that responded to the emergency, and others as to what happened that day and afterward.—The Editor.

The jangle of the ringing telephone, with its customary demand for attention, continued its clamor with no hint that the message about to be delivered would differ substantially from hundreds of telephone messages that preceded it. When the receiver was lifted from its cradle, the clamor ceased momentarily.

Bill Martin, mine superintendent at the Dutch Creek No. 1 coal mine, stepped out of the meeting he was attending to take a phone call late in the afternoon of Wednesday, April 15, 1981. It was no routine call. In fact, the news jarred him like a punch to the solar plexus. There had been an explosion at the mine. Most of the 23 second-shift miners were still underground.

Quentin Rees, the hoist operator who had called from a phone near the mine's entrance, explained what he had just seen moments earlier. Rees had been helping another miner unload trash from the hoist cars at the portal when he felt the wind rise briskly around him.

Looking up, he saw dust billowing from the mine fans that pull fresh air through the many miles of underground passageways at the mine. Worse yet, from the mine openings in the mountainside through which fresh Rocky Mountain air was supposed to be entering the mine, clouds of dust came pouring out. Rees, who had worked at the same mine in 1965 when an explosion killed nine miners, had immediately known what had happened.

So did Bill Martin.

Wasting little time, Martin explained what Rees had told him to M. J. Turnipseed, manager of mines for Mid-Continent Resources, Inc., operator of the mine. As Martin rushed from the company's office to the mine portal, Turnipseed began the pyramid-like progression of emergency telephone calls to other company officials, the Mine Safety and Health Administration (MSHA), the Colorado Division of Mines, mine rescue teams, ambulance squads and local hospitals that might be required to provide emergency medical support.

"Without hesitation, the rescue teams assembled, collected their gear, and reported they were available for the operation."

At the same time, Rusty Ford, the trainer for Mid-Continent's mine rescue teams, began calling his team members instructing them to meet at the mine to prepare for the rescue operation. With each phone call, the trainer's message was clear. This would not be another practice session. Each team member knew that skills learned through many hours of training and practice would soon be put through the cruelest of tests.

When Dutch Creek No. 1 spewed dust into the Colorado air shortly after 4 o'clock that Wednesday afternoon, 21 miners were working in various parts of the mine. In the farthest reaches of the six main entries driven on a slight slope deep into the mountainside, almost 7,000 feet from the mine's entrance, a six-man crew was advancing the No. 4 entry through a fault zone that created some roof control problems requiring modifications to the normal mining plan.

A second crew of nine miners was advancing one of two entries of the 102 section, which had already been developed about 1000 feet from its perpendicular intersection with the main slope entries at crosscut No. 63. The other six miners were working in the main slope entries closer to the surface.

Lee McBride and Jack Anderson were closest to the surface in the No. 3 entry at No. 17 crosscut. With crosscuts intersecting the main entries every 100 feet, one-third of a mile of underground passageways separated the two men from the waning surface daylight when McBride felt a pressure buildup.

The two miners dove into the crosscut as the blast and the dust it raised roared up the entry that moments earlier had carried fresh air deeper into the mine. Their vision obscured by the dust, the two joined hands and started walking up the No. 3 entry. The air began to clear as they neared the surface, and at No. 10 crosscut they crossed over to the No. 4 entry with its still-running belt conveyor, jumped onto the moving belt and rode it to the surface.

David Chiarello, who had been working near the belt drive in the No. 4 entry near No. 41 crosscut, heard a sound like a gunshot. Dust and wind blew up the slope towards the surface, knocking Chiarello's hat off as he crouched to avoid the dust.

After about 20 seconds, the rush of wind abated and the dust began to clear. Chiarello picked up his light and made his way to the phone near the belt drive to call outside, but when he picked up the phone, Quentin Rees, the hoist operator, was already on the other end of the line. Chiarello confirmed what Rees had suspected and told the hoist operator that he was going down the slope to see what had happened.

Chiarello moved over to the No. 6 entry that contained the track for the hoist cars that carried miners and supplies to and from the mine's work areas. Following the track, he began walking down the slope and soon found three miners, alive but unconscious. One was lying by the mechanics' bench in crosscut No. 53, about a mile from the mine's portal; another was propped against the rib near the front of a scoop in the next crosscut down the slope; the third was found in the middle of the track slightly farther down the slope.

Looking for a nearby phone, Chiarello ran into air that burned his lungs. He returned to the phone that he had just used near the belt drive, checking on each of the three injured men as he went, and called the surface at about 5 p.m. to report what he had found.

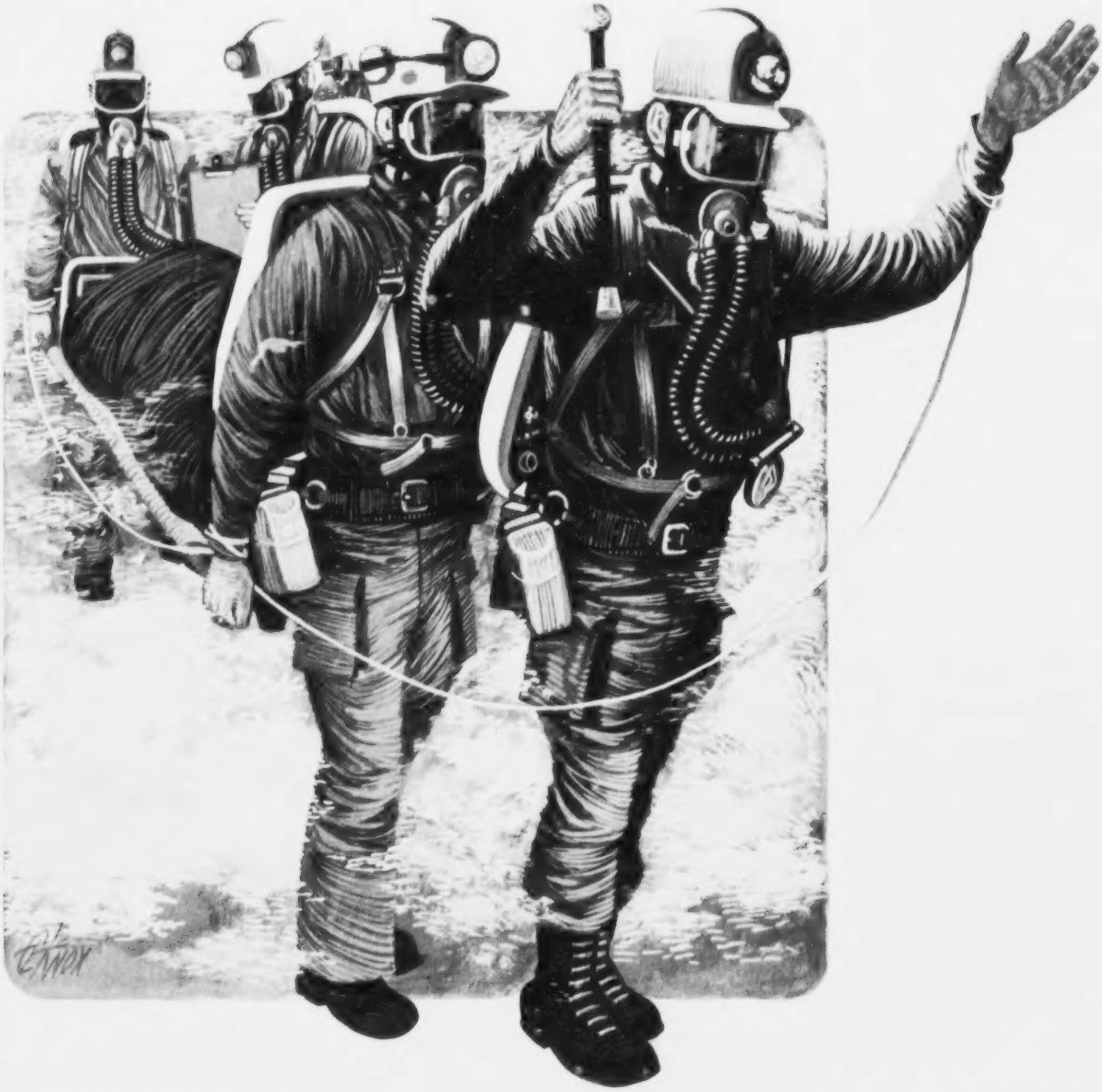
Ed Cerise, first-shift mine foreman at Dutch Creek No. 1, took Chiarello's call and at first instructed him to stay near the telephone, then told him to come out of the mine. Instead Chiarello returned to the three injured men.

When that call was received at the surface, the first of the Mid-Continent rescue team members who had arrived at the portal were checking out their breathing apparatus, but a full team was not yet ready to go underground.

M. J. Turnipseed, Mid-Continent's manager of mines, discussed the situation over the telephone with MSHA officials and decided to send two rescue team members wearing self-contained breathing apparatus ("under oxygen") into the mine for Chiarello and the three injured miners.

About an hour after the explosion, Lee McBride, who had just escaped from the mine and was one of the company's most experienced rescue team members, and Tim Cole, another rescuer, entered the mine, found the four miners, and returned with them to the surface at 6:39 p.m.

It would take 36 more hours of work by seven different mine rescue teams and a number of work crews



repairing stoppings before the body of the last of the explosion's 15 victims would be recovered and brought to the surface.

The rescue team members and briefing officers who worked through those 36 hours brought to Dutch Creek many years of mining experience and many months of training and practice in mine rescue and recovery procedures. Some, like Lloyd Miller, mine superintendent at U.S. Steel's Somerset Mine and briefing officer for his mine's team, were veterans of other rescue operations. Miller, a participant in recovery operations following four other mine explosions, had also contributed to more than 30,000 employee hours under oxygen without an accident recovering the Somerset Mine from a major mine fire in 1972.

Others, like Ray Guymon, team trainer from Emery Mining Corp., though lacking actual emergency experience, had sharpened their skills by participating in regional and national mine rescue contests. In August 1981, Emery's team duplicated its achievements from the national contest two years earlier by winning its second consecutive combination title for mine rescue and first aid. All of them, like Link Derick, Colorado Westmoreland's safety manager and briefing officer for the two teams his company's Orchard Valley Mine sent to Mid-Continent, shared a common dedication to mine rescue work.

Mid-Continent appreciated that dedication. "The response of the mine rescue teams and emergency medical personnel was timely and most professional," said an article from the company's newsletter several months after the explosion. "Without hesitation they assembled, collected their gear, and reported their availability for standby or rescue operation."

Within two and a half hours of the explosion, the two Colorado Westmoreland teams were on their way to the accident site to join the two Mid-Continent teams that were assembling at the mine. The U.S. Steel team from the Somerset mine would soon follow. Two other teams from eastern Utah, one from Price River Coal Co., the other from Emery Mining Corp., were called and placed on standby status, as were the two MSHA teams from Pittsburgh, Pa., and Morgantown, W.Va.

As one of their first steps in response to news of the explosion, company officials and MSHA inspectors who soon arrived at the mine had established monitoring stations at the two mine fans that ventilated Dutch Creek No. 1.

First reports from those stations at 4:35 p.m. indicated high carbon monoxide (CO) levels of 3,000 parts per million (ppm) in the air coming from the mine. Periodic reports over the next several hours indicated that concentrations of CO and of potentially explosive methane were declining.

These reports suggested that there were no secondary fires in the mine that might have been started by the intense heat of an explosion. As a result, MSHA and company officials considered it safe enough to send a rescue team underground to explore the mine.

Shortly after 7:30 p.m., the Mid-Continent No. 1 team, led by Grant Brady, Jr., entered the mine. Noting that the currents of fresh air that ventilated the mine were moving properly when they reached No. 41 crosscut about three quarters of a mile into the mine, the team began exploring barefaced at that point.

When they reached No. 48 crosscut, they found the first signs of damage to some of the overcasts, the metal ventilating structures built to allow fresh intake air moving along one passageway to cross stale return air in another without intermingling. Damage to the overcasts defeated their purpose and, in effect, "short circuited" the mine's complex ventilation system at and beyond that point in the direction of the face. Brady's team then went under oxygen for further exploration.

As they walked deeper into the mine, the team found that all the stoppings that had been built to direct the airflow in the mine's main slope entries from No. 51 crosscut on down were damaged to some degree; those that they found beyond crosscut No. 55 were destroyed by the explosion's forces.

Rescue team members feared that flooding at the bottom of the slope could endanger any miners who still might be alive behind barricades . . .

More than a mile from the surface in the No. 7 slope entry, the team worked its way through the darkness to the mouth of the 102 section at crosscut No. 63.

There they found extensive damage to the belt conveyor that once carried coal from the 102 section to the belt in the No. 4 main slope entry. The overcast at the intersection was now a heap of twisted and torn metal rubble, barely visible amid the smoke that was coming from the first of the section's two entries. A gas check at that point revealed 2.5 percent methane and 50 to 100 ppm carbon monoxide.

The team moved slowly down the slope 100 feet to the next crosscut and found more smoke coming from the second entry of the 102 section, the entry that before the explosion carried fresh air to the section's coal faces. Without exploring the 102 section, the Mid-Continent No. 1 team crossed the six main slope entries and detected 3.0 percent methane in the No. 2 slope entry near No. 63 crosscut.

Finding little to offer them any encouragement, Brady's team walked back up the slope to the hoist cars and returned to the surface at 10:30 p.m.

On the surface, company officials conferred with Lamar Bishop, MSHA's subdistrict manager who had just arrived from his office in Price, Utah, and other MSHA officials who had been at the mine since early evening.

With such extensive damage in the slope entries, company officials decided that rather than send the second Mid-Continent team underground next, one of the two Colorado Westmoreland teams should go underground to repair damaged stoppings and to restore as much ventilation as possible to the areas explored by the first Mid-Continent team.

After being briefed on what was known about the conditions underground, Colorado Westmoreland's No. 1 team, led by captain Don Emmons, entered the mine just before midnight, accompanied by one Mid-Continent mine rescue team member.

"All we had going into that mine was a report that right ahead of us was 3 percent methane and dense smoke," said Link Derick, briefing officer for the Colorado Westmoreland teams. "They wanted us to start changing the ventilation, and we said, 'No.' We had to explore a little bit ahead of ourselves before we'd go into gas of that magnitude."

Once underground, Emmons' team ran into some minor difficulties. A fresh-air base had been established at the mechanics' bench in No. 53 crosscut between Nos. 5 and 6 slope entries, but explorations beyond that point were hampered because the team's communications lifeline kept hanging up on pillars separating the passageways and on other obstructions.

"That cable isn't nearly as portable as people think," said Derick. "You've got to worry about where your line is because it just won't go with you. That cable got so hard you could hardly pull back on it."

Knowing that stoppings would have to be built or repaired in the crosscuts between Nos. 2 and 3 slope entries, the team established a second fresh-air base in No. 52 crosscut between Nos. 3 and 4 entries. This gave the Colorado Westmoreland No. 1 team and the teams that would follow a straight shot down the No. 3 slope entry to lay their lifelines as they worked on the stoppings.

After building one temporary stopping in No. 52 crosscut and beginning a second in No. 53 crosscut, the Colorado Westmoreland No. 1 team returned to the surface at 3:20 a.m. on Thursday, April 16.

When they reached the surface, they briefed the second Colorado Westmoreland team. Led by captain Harry Galer, the No. 2 team from the Orchard Valley Mine entered the mine at 3:47 a.m., accompanied by Jack Matekovic from MSHA and another Mid-Continent rescue team member. At MSHA's request, the team took a vacuum bottle air sample at the No. 60 crosscut in No. 2 slope entry and then resumed work on the temporary stoppings between Nos. 2 and 3 slope entries.

While his team worked on the stoppings, Derick backtracked toward the mine's portal and examined several stoppings and overcasts as he went. He recalled, "We found many ventilation devices had been totally short-circuited. The overcasts were blown out or the panels were blown up. We'd go back and find an overcast that was gone, the whole wing wall was gone out of it or something, and it was reported as fully intact."

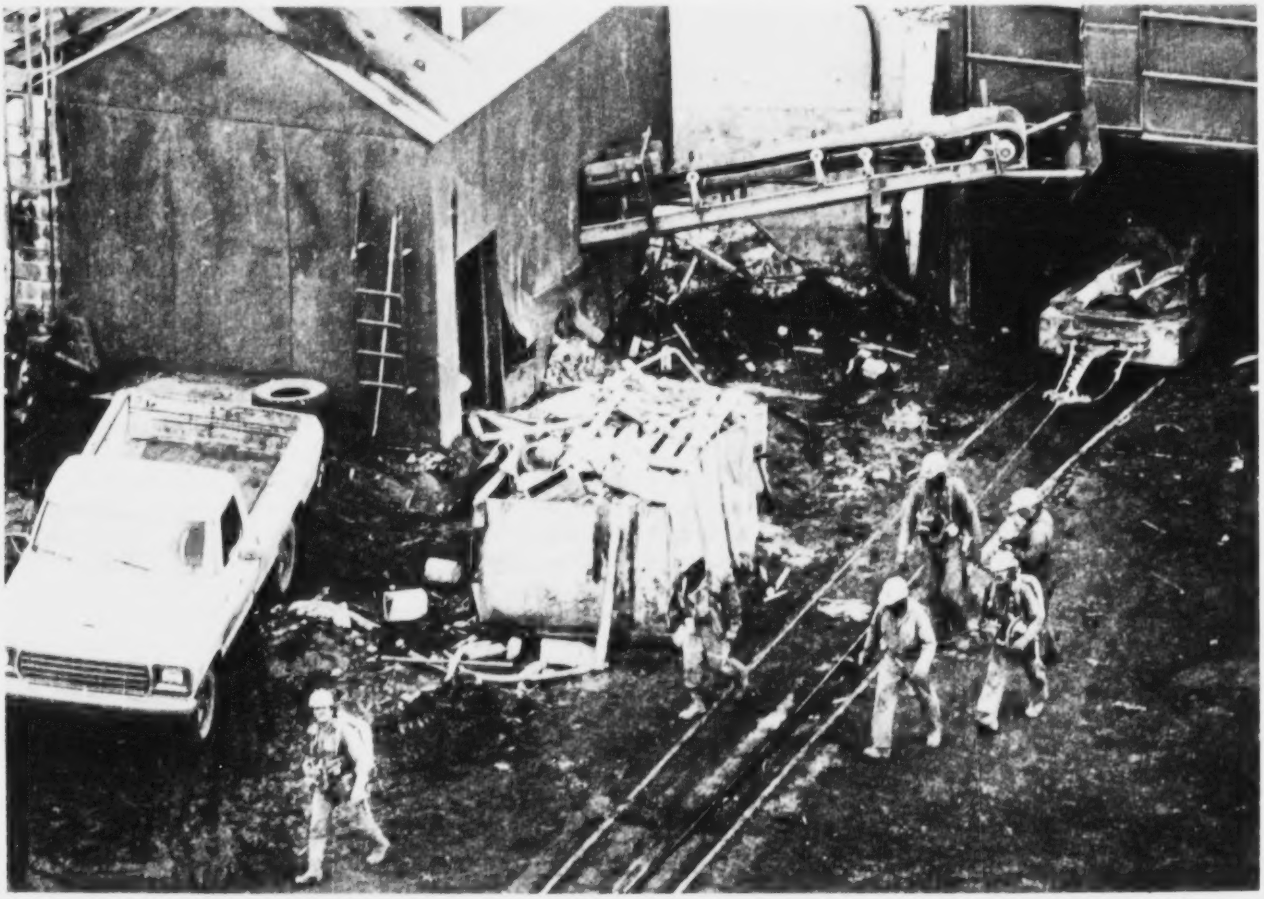
Galer's team repaired the damaged stoppings and overcasts that Derick discovered and erected temporary stoppings down to crosscut No. 55 before returning to the surface at 7:30 a.m.

With a growing understanding of the work yet to be done, a second call for assistance went out from Dutch Creek No. 1 while the second Colorado Westmoreland team was still underground. The two Utah teams that had been alerted Wednesday afternoon were asked to respond, and both were soon on their way to western Colorado.

Derick had reported that water was running freely down No. 2 slope. That report raised some concern that the face areas at the bottom of the slopes might become flooded. If miners were alive and barricaded in those areas, flooding would create additional problems for trapped miners and rescuers. To control the water at the sump, a pump near No. 31 crosscut would have to be energized.

The mine's main electric power circuit had been disconnected at the surface shortly after the explosion occurred to eliminate the mine's electrical system as a possible source of ignition should there be any explosive accumulations of methane and air in those parts of the mine that were now unventilated.

The danger of a second explosion still remained, so the Mid-Continent No. 2 team, led by Duane Mortensen, entered the mine at 8:10 a.m. and began to cut and separate all pipes, power cables and belt ropes that might carry stray electric current beyond the pump into unexplored and unventilated areas of the mine. When this work was completed, Mortensen and his team returned to the surface at 11:40 a.m.



Accompanied by officials, weary members of a rescue team emerge from the Dutch Creek No. 1 underground coal mine following an explosion that killed 15 miners. Seven rescue teams assembled at the Colorado mine to undertake the difficult recovery operation.

Shortly after noon Thursday, the U.S. Steel team from the Somerset Mine, directed by mine superintendent Lloyd Miller and led by team captain Donovan Story, entered the mine, went under oxygen at No. 53 crosscut, explored down No. 7 slope to No. 57 crosscut and across the crosscut to No. 2 slope. After gas tests revealed that no harmful gases were present, the team elected to work open-faced as they erected temporary stoppings and repaired overcasts. Team members also built a regulator on the No. 7 slope between Nos. 55 and 56 crosscuts changing the air currents beyond that point from return air to intake air.

This change eliminated the need to erect temporary stoppings along that side of the slope entries and allowed the main slope entries to be ventilated more quickly by the teams that followed. At 5:12 p.m., the U.S. Steel team returned to the surface.

Just after 6 p.m., the Mid-Continent No. 1 team reentered the mine to establish ventilation and explore the remainder of the main slopes beyond No. 64 crosscut. While this team was underground, John Barton, MSHA's district manager, several Mid-Continent officials and more construction crew members entered the mine.

One group discovered six victims in the No. 4 slope between No. 67 crosscut and the face area. At about the same time, the Mid-Continent team, which had been exploring the 102 headgate section under oxygen, discovered three victims in the face area of that section's No. 1 entry, but did not find the five other bodies found later in the same area. After six hours underground, this team returned to the surface just after midnight.

An hour earlier, the Price River mine rescue team, lead by captain John Grako, went underground, left their breathing apparatus at No. 63 crosscut, and began building temporary stoppings in the 102 section. The Emery Mining Corp. team entered the mine at 12:20 Friday morning without their apparatus to assist in the recovery of the bodies that had been located.

Once ventilation had been reestablished in the 102 section, a more thorough search of the section led to the discovery of the five victims in the No. 1 entry, leaving one miner still unaccounted for.

Workers searched the old 101 longwall section that had been mined out, as well as the face areas of Nos. 2 and 3 main slope entries to no avail. It was then decided to search the now flooded area at the face of No. 2 entry in the 102 section. Workers soon found the submerged body of the last victim.

Once all the bodies had been recovered from the mine, the recovery operation ended as all those who had been working underground returned to the surface at 7 a.m. Friday, April 17.

Seven mine rescue teams, physically exhausted and emotionally drained from the marathon recovery operation and the explosion's tragic outcome, saw scenes that could never be duplicated in any training session or any mine rescue contest. While no one would ever wish for an opportunity to participate in an actual emergency operation, most would agree that first-hand experience in such a situation leaves a lasting impression on those involved, despite their intensive training that often exceeds that required by MSHA's standards.

"They're very well-trained folks," said Lloyd Miller speaking of his team from U.S. Steel's Somerset Mine, "and they saw some real good examples and got some real good experience there. They saw, in actuality, anything they may have had a few doubts about."

Ray Guymon, trainer for the Emery Mining Corp. team, agreed. "You train, and you do the contest work, but you never know exactly what to expect or how your people will react or some of the little things that maybe you've overlooked that you're going to need at a disaster," he said. "It was just a really good experience to go that one time to see exactly what it *was* like and how the people would react. Not only that, but the team learned a lot about what to expect from other people, what type of support we'd get, and how we'd be involved with the other teams."

Those weren't the only lessons from the recovery operation at Dutch Creek No. 1. "The biggest thing we learned out there is being ready," said Link Derick, briefing officer for the team from Colorado Westmoreland's Orchard Valley Mine. "When you're ready to go, you have your brass hammers, you have your tool kit, you have your fire extinguishers, and you don't have to go looking for them."

Guymon mentioned that the Emery team learned from a similar problem. The Emery mines are west of the team members' homes, and the team had to travel east to Mid-Continent's property. Most of their mine clothes were at the mine, leading to a slight delay in the team's response. "Now in our rescue vehicle, we have a bag made up. It's like a gym bag, only larger, and it has everything we need in there, right down to socks and underwear and the whole shooting match," said Guymon.

Derick said that his teams have established one change in team procedures based on their experience at Dutch Creek. "We felt we made a mental error," he said. He explained that their No. 2 team, working open-faced as they repaired stoppings in good air, elected to put their apparatus in a central location. "Towards the end of their shift, we realized that they didn't all have self-rescuers, and here their Draegers were maybe two crosscuts away," he said. Team members are now required to either wear their apparatus or have it right next to them at all times while they are working underground. "We realize," added Derick, that if anything had happened inby, they might have been in trouble."

Emery's Ray Guymon also had some second thoughts about his team's decision to leave their apparatus at the surface when they entered the mine in good air that Friday morning. "If I had it to do over again," he said, "I'd have my apparatus in there. I might take it in and put it on the rib and leave it if we weren't working, but I'm going to have it with me."

Guymon also suggested that with so many teams involved in the operation's rotation, it would be helpful to the teams if their briefing officers could participate in the operation's control center for several shifts prior to a particular team's scheduled shift.

"I wouldn't necessarily want to make decisions or be involved in running the show at all, unless I could see maybe a problem building up, but I'd want to be there so I could be aware of what had been done and exactly where things stood when the team went underground," he said. "I think, by doing that, I could be a lot more valuable to the team in briefing them and letting them know just exactly what had been done ahead of us."

While there are differences among the teams in training practices or in attitudes toward contest participation, those interviewed agree on the value of mine rescue training in preparing for emergencies. U.S. Steel's Lloyd Miller, who served on a mine rescue team 30 years ago with Bill Ward, now an MSHA coal mine inspection supervisor in Delta, Colo., explained his company's attitude this way: "Our people realize the significance of mine rescue work, how important it is to have these well-trained teams. You've just got to have it, that's all."

The participants in the recovery operation were not the only ones to benefit from the lasting impressions left upon the various team members and briefing officers. "It sobered me," said Ted McCandless, director of training for Emery Mining Corp., explaining that his team's participation has had an effect company-wide.

"I use some of the team members in our annual refresher training," he said. "They can tell our employees very graphically the condition of a mine following an explosion." Most of these training sessions often begin with some good-natured laughter and carrying on, he added, "but after a team member explains what he saw, they're all very quiet and very attentive."

The teams that worked those long hours following the explosion at Dutch Creek No. 1 continue to train and practice their skills, knowing that they will be ready when the next phone call comes, but hoping that their services will never be needed again.

Mine Rescue Section

Part II -- A SPECIAL BREED OF MINER

Plummeting temperatures and fresh snowfalls brought a momentary calm to the Appalachian hills in early December 1907—a stillness that would be shattered over the next few weeks as four major mine explosions in the region killed more than 692 men. Of this number, several had escaped the initial horrors only to be overcome by toxic gases as they tried in vain to rescue brothers and friends trapped inside the smoking shafts. In Europe, many mine operators maintained professionally trained mine rescue teams capable of reacting effectively in large-scale emergencies. But in the United States, where demands of the rapid pace of industrial expansion continued to take a severe toll in lives, even the larger underground coal mining operations had only few trained professionals on hand in the event of a serious emergency.

Public outrage following these tragedies finally pressured lawmakers to create a new agency—the Bureau of Mines—in 1910. The agency's first director, Dr. Joseph A. Holmes, was as intent on establishing a new cadre of mine rescue specialists as he was on proving, in a series of experiments, that coal dust by itself has enormous explosive qualities. He managed to persuade the Pullman Company to donate four railroad cars, which he then equipped with sophisticated mine rescue gear and staffed with trained Bureau people. Rather than have the cars stand idle between mine emergencies, Holmes sent the rolling stock to mining areas throughout the Nation in an effort to train willing mine operators and miners in the art of professional mine rescue techniques.

By late 1911, these traveling classrooms had schooled enough miners and had generated sufficient interest to support the country's first national coal mine rescue and first aid contest—an event witnessed by President William Howard Taft and covered by major newspapers. Twelve more coal mine rescue contests were held until the activity was halted in 1930 due to industry shutdowns during the Depression. The tradition was reestablished in 1951, and has continued in odd-numbered years through modern times. Later in even-numbered years, metal and non-metal mine rescue contests have been conducted.

Mine rescue capabilities have

grown considerably and techniques have improved immensely over the years, bolstered by a spirit of voluntarism among mine operators and miners that appears to contain elements of both professional pride and a bond of kinship that often exists among groups of people who have shared risks and hardships for many years.

An inventory of mine rescue teams indicates that more than 400 teams are available nationwide for use in emergencies at coal or metal and nonmetal mines. MSHA also has in readiness a large team made up of rescue, recovery and mine evacuation experts and specialists in ventilation, mine gases and other technical areas in which there is a critical need for expertise during a mine disaster.

Though both large and small coal and metal and nonmetal mining operations have traditionally maintained a sizeable force of well-trained mine rescue people over the years, a provision in the Federal Mine Safety and Health Act of 1977 recognized deficiencies in some rural mining areas and called for minimum requirements for mine rescue teams for underground mines.

The standards, Part 49, Title 30, Code of Federal Regulations, which were developed with the aid of industry, labor and the public, were published in July 1980, and became effective a year later.

Among other things, the standards require that at least two mine rescue teams, composed of five members and one alternate each, should either be established by mine operators, or should be provided for by other arrangements while miners are working underground. If an underground mine has special mining conditions which may not warrant a full mine rescue capability, or if a mine meets the criteria for being "small and remote", the mine operator may also provide for alternative mine rescue availability under approval of the appropriate MSHA district manager. Most importantly, the standard requires that no mine served by a mine rescue team should be located more than two hours travel time from the mine rescue station with which the mine is associated.

> *"Downwind, the smoke was so thick you couldn't see two inches in front of you. We felt our way along . . . , followed procedures, and everything worked out . . ."*

A minimum of 20 hours of training must be provided to all new mine rescue team members in the use, care and maintenance of breathing apparatus, followed by a minimum of 40 hours of annual refresher training in advanced mine rescue techniques. Since the last comprehensive mine rescue training materials were published by the Bureau of Mines in 1961, MSHA requested that the Bureau develop updated training programs that would satisfy the criteria under the new standard. Under a Bureau contract in cooperation with industry, state and federal officials, and members of the National Mine Rescue Assn., West Virginia University developed a series of training modules for both the coal and metal and nonmetal industries which satisfy the standard. These have been approved for use and are being made available.

While many coal and metal and nonmetal mine operators have taken advantage of the new training programs, others have submitted their own custom-tailored training plans for approval by MSHA. The use of MSHA training modules is not mandatory, and training beyond requirements of the standard is strongly encouraged, according to James D. Pitts, an MSHA metal and nonmetal safety specialist who coordinates metal and nonmetal mine rescue programs nationwide. "The modules are well written and establish a good base," Pitts said, "and they are being actively used. At the same time, a number of companies are providing added instruction to suit their own needs."

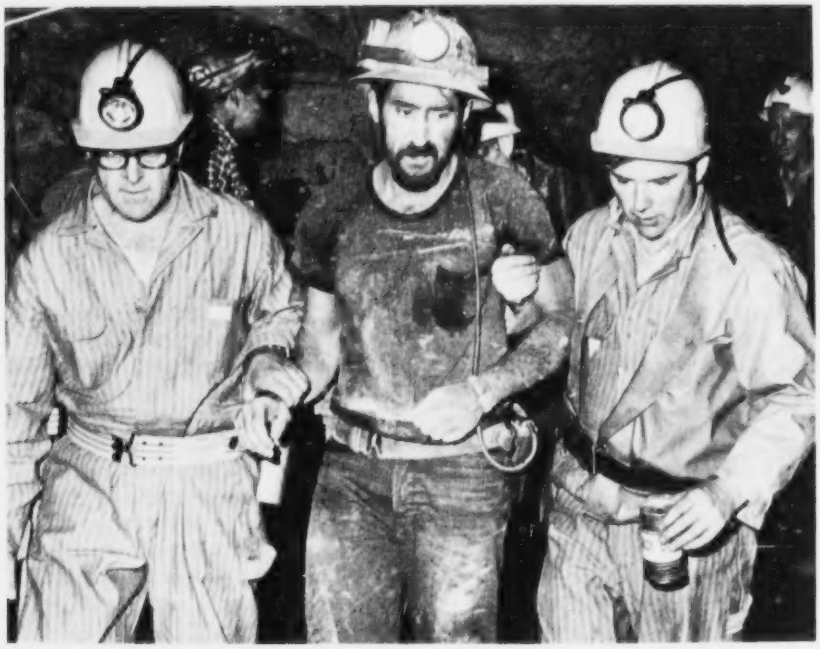
He said that most major mining companies already go far beyond the requirements, and that this is especially true of those that actively compete in both regional and national mine rescue contests.

Although some persons in the mining industry may doubt that training for competition adequately prepares teams for real emergencies, both Pitts and Ernie Teaster, an MSHA coal mine safety specialist who coordinates the coal mining rescue program, contend that the long hours of team practices in preparation for contests have reaped several practical benefits.

"Competition team members who have participated in real disasters always tell me that the contests greatly enhanced their skills," Teaster said. "More than anything else, I'm told, a contest teaches them to work systematically, methodically, and as a team. Besides, contest teams generally practice more than those that don't compete, and I believe that can make a big difference."

Aside from the national contest, coal company teams compete in 14 regional events. While metal and nonmetal mine operators have maintained a large number of teams over the years, team competition among them is a relatively recent phenomena, born, for the most part, of concern generated by the 1968 Belle Isle Salt mine fire in Louisiana that killed 20 miners and the 1972 Sunshine Mine fire in Idaho in which 91 died. Since 1968, six regional metal and nonmetal contests have been organized, and in 1976, the first national contest was held in Salt Lake City, Utah, with 19 teams participating.

In 1981, at the metal and nonmetal Western Regional competition in Grand Junction, Colo., 27 teams competed for top honors—nearly as many as those that participated in the 1980 national contest in Dallas, Texas, in 1980. The contest was sponsored jointly by MSHA and the Colorado Mine Rescue Council, a group of 14 mine operators founded in 1978 by Byron "Moose" Brum-



Ron Flory, one of two men trapped for a week in Idaho's Sunshine silver mine following a 1972 fire that killed 91 of their co-workers, is shown, above center, being helped out of the mine after he was rescued through a borehole.

baugh, safety director at AMAX Inc.'s Henderson Mine, and by Benny Kilgore, safety director of Union Carbide's metals division. Brumbaugh's teams placed first and fifth in the competition, a reward well worth the 160 hours of instruction and training the teams received in 1980.

Brumbaugh maintains two additional teams at Henderson mine which undergo an average of 80 hours training annually, much of it underground at the property and at the Colorado School of Mines' experimental mine in nearby Idaho Springs. Even though lengthy practice sessions demand that team members sacrifice much personal time, Brumbaugh says he has no shortage of applicants. "There's a lot of prestige in being a team member, and I suppose one of the main reasons is that only the top miners are selected," he said.

Among other qualities, team candidates must demonstrate strong physical traits, emotional maturity, proven mining skills, good work records, and above all, an ability to work well with others. "In this kind of work, team members have to be both confident in themselves and in each other," Brumbaugh said. "When our teams first got together a few years ago, these people hardly knew each other. Today, they are inseparable. They know that their lives depend on working together as a single unit."

Even though there is great pressure for rescuers to lose no time in reaching survivors or recovering bodies in a mine accident, the personal safety of team members must be the first consideration in mine rescue work. Depending on the condition of a mine following a fire, explosion, major fall of ground, or even an inundation, rescue team efforts may at first appear to outsiders to be inordinately slow as team members progress carefully into the mine, repairing damaged ventilation controls and other structures and equipment while progressively establishing new fresh air bases. Working under the weight and artificial environment of an oxygen-breathing apparatus, often in a hot, humid, cramped and smokey mine atmosphere, the physical strain can tell rapidly on even the most robust of individuals. Any failure to follow established procedures can obviously impede progress and even imperil team members and possible survivors.

"You've heard the old expression, 'We didn't have time to do it right the first time but we had time to do it again?' . . . Well, in mine rescue you don't have a second chance," said J. D. Pitts. "It is simply inexcusable to have a team member injured or otherwise put out of action because good procedures weren't followed."

Why do miners volunteer to serve on mine rescue teams, always on call for highly hazardous emergency duty?

"You'd be surprised at some of the answers I get," said Dick Skelton, a safety engineer and mine rescue instructor at Magma Copper Co.'s San Manuel Mine near San Manuel, Ariz. "The people who tell me they want more experience . . . to improve their working ability . . . , those are the ones I select.

"The type of person who wants some kind of personal glory, I rule them out right away. You see, it takes a special breed of miner . . . a team player . . . the kind of person who has a good sense of himself."

Selected from an underground workforce of more than 1,900 miners at peak production level, San Manuel's 12 mine rescue teams, with 60 team members, are "the cream of the crop," Skelton said. The waiting list of hopeful applicants is often backed up as long as three years, and even many of those selected to undergo Skelton's rigorous training regime eventually drop out or are disqualified after the first couple of days. "I make the training damn hard the first three days so we can see what they're made of. Some of them get so mad at me they can't see straight," Skelton said.

On the first day of training, applicants get eight hours of classroom instruction in the use of the oxygen-breathing apparatus and in the principles of mine rescue. Then the next day, donning the apparatus, trainees spend a full shift under oxygen, duckwalking, climbing stairwells, and tackling a monstrous

For results of the 1982 National Metal and Nonmetal Mine Rescue Contest held in August, see Pages 30 to 32.

"killer hill," a mound of waste material banked on a 70-degree angle.

Survivors of this test go underground the next day where they learn how to operate a foam machine and practice building bulkheads, all while still under oxygen. On the average, Skelton's crews get about 80 hours of training annually.

Garry Alexander, a San Manuel miner with more than five years' experience, recently remembered his first classes with Skelton. "It is every bit as tough as military basic training, and I believe that hill is what makes or breaks a mine rescue man around here," he said. "It's hot wearing equipment . . . it's 200 yards to the top, and for every two steps you take, you slide one step back. It's about the hardest thing I've ever had to do."

Alexander believes the training paid off when he went underground in May 1980 to contain a fire that had broken out on the 1,775-foot haulage level. "The training had given me a lot of confidence in working as part of the team," he added. "On the upwind side, you could see the flames, but it didn't really bother me. On the downwind side, the smoke was so thick you couldn't see two inches in front of you. We just felt our way along very carefully, followed procedures, and everything worked out all right.'

Greg Celaya, 25, had three years of mining experience when he volunteered to go underground to take gas samples as part of a back-up team during the fire. With several more experienced team members he cautiously moved underground to a point near the fire zone. "It was a hell of an experience," Celaya said. "At one point, I got a headache, got a little nervous, and was on the verge of hyperventilating. I started wondering if I had a leak in the hose, if I was getting carbon monoxide. Turns out I had the headband on too tight. The experienced fellows really helped me out . . . and you just have to remember that you are working together as a team."

Perhaps the most harrowing moment of the successful fire containment effort came when a team was sent underground to evacuate an explosives magazine in the fire area. Bill Benavidez, 38, a mine rescue team captain, was selected to head up the group. Though he was familiar with the area and with the contents of the magazine, he could not be sure just how far the fire had spread. With little visibility and only a lifeline to keep team members together, the team eventually carried the powder away from the fire zone in several wheelbarrow loads.

"At the time, I didn't really think anything of it," Benavidez said, "I don't think you have the time to think that much about the dangers involved. "Thanks to the training, you know you are pretty secure and safe. Of course, a person can get pretty shaken up, and when we get a new man, we try to keep him occupied so he won't think about the possibility of getting hurt. You just have to stay alert and be coolheaded."

"The key to it all," Skelton said, "is that all team members must think as one. I don't want anyone grandstanding by taking unnecessary chances. I don't want anybody to play hero. When it comes right down to it, they are all heroes to me anyway."

Mine Rescue Section

Part III -- GOING DOWN A SMOKING 'CANNON BARREL'

By John McGrath
MSHA Staff Writer

From all accounts, entering a blown-up section of the P and P Coal Co.'s No. 2 Mine shortly after a methane explosion occurred on July 7, 1977, was something like crawling down the barrel of a cannon that had just been fired.

Smoke from fires was heavy at times and concentrations of deadly carbon monoxide were detected as rescue and recovery teams slowly moved through blackened passageways toward the area where four missing men were believed to have been working.

Three teams of trained mine rescue volunteers had responded to the emergency at the P and P mine at St. Charles, Lee County, Va. Two were made up of employees of the Stonega division of the Westmoreland Coal Co., Big Stone Gap, Va. The third was from the Clinchfield Coal Co., Dante, Va.

Had the four missing miners survived the effects of the explosion, the chances were considered very good that rescuers would have brought them out of the mine alive. When the burned bodies of the four men finally were located close to the site of the explosion, however, it was starkly apparent that they had died in an instant in the searing heat and concussive force of the explosion. Sixteen others who had been underground at the time of the explosion had managed to reach safety.

The sad outcome could not diminish the heroic efforts of the rescue team members, who, until it was proven beyond doubt that the missing miners were dead, proceeded on the assumption that lives could be at stake.

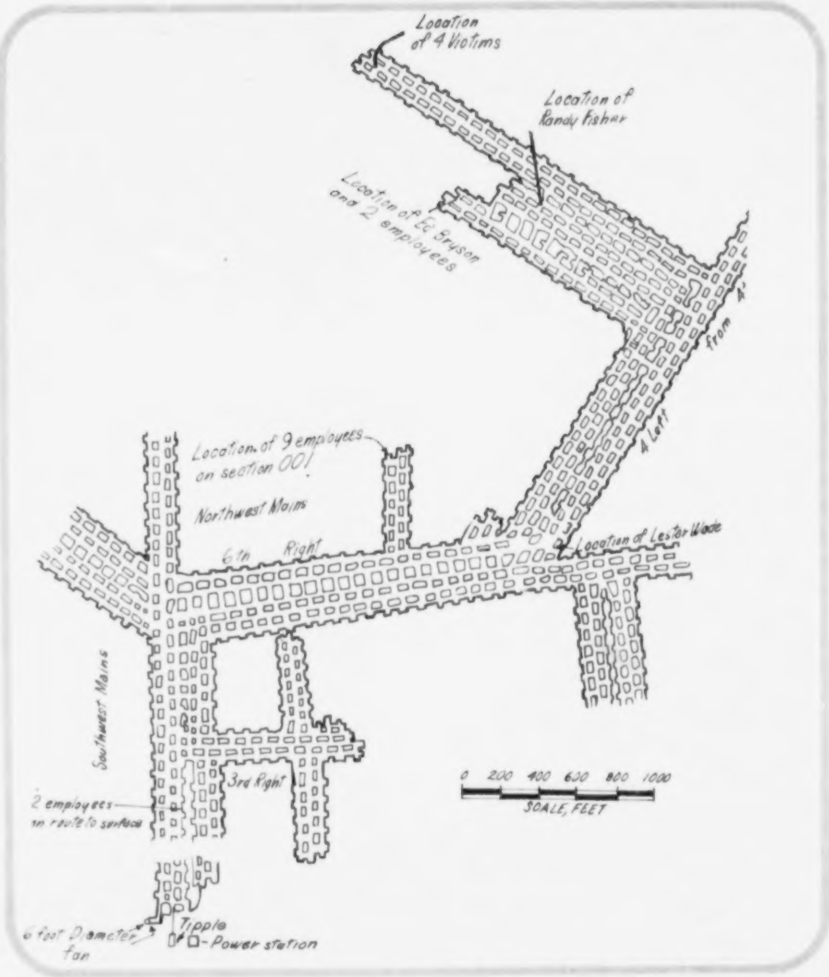
In retrospect, Mine Safety and Health Administration* officials at the scene viewed the P and P mine rescue and recovery operation as one of the better ones they have known, considering the problems encountered, particularly the problem of working in coal seam heights of three feet or less in places.

Ray Ross, MSHA district manager, Coal Mine Safety and Health, at Norton, Va., said that the recovery went "pretty much by the book," adding, "In any type of mine recovery situation, there are tremendous problems to be overcome, and this was done at the P and P.

"There was no shortage of people to help out. Company employees helped get the necessary equipment, rebuilt stoppings that had been blown out, cleaned up debris and helped to haul rescue teams and their equipment from place to place when needed. And there also were many volunteers from other mines."

Monroe West, MSHA subdistrict manager at the time of the explosion who now is a coal company official, said, "The three rescue teams were as fine a set of teams as I have ever worked with." West, who with inspector Jim Taylor was underground throughout the operation, said, "The conditions were pretty brutal. As they got closer to where the bodies were, the entries they were working in were very wet. All work in exploring was done under oxygen (wearing breathing apparatus as protection from toxic gases)."

This was, all of those involved recall, extremely uncomfortable, physically debilitating work; the presence of high concentrations of carbon monoxide that had to be flushed from the mine by infusions of fresh air and the possibility, however remote, of a second methane explosion, also created psychological pressures on rescue team members.



Map of the P and P Coal Co.'s No. 2 mine show the route to the victims taken by searchers.

Louis Hennegar, a member of Westmoreland's No. 1 rescue team at this operation, said, "It was pretty tough, but we knew we just had to keep going because those men were considered alive until they were accounted for.

"Working in low coal and muddy ground like that, your knees get torn up. It can be a real problem working on your hands and knees with your apparatus on your back dragging against the top. One man collapsed when a gasket was lost from his facepiece. The team pulled back to the fresh air base right away, and the man recovered."

Those who were underground during the recovery operation thought that all three teams had performed well, working carefully to make sure all team members were following safe procedures, and that, despite many problems, the operation had been conducted with a minimum of mistakes.

At about 10:35 a.m. that July 7, MSHA got a call from the mine saying that four men had been trapped in what at that time was thought to have been a massive roof fall. MSHA officials then issued the first call for volunteer rescue teams.

When Monroe West, Jim Taylor, and inspection supervisor Alfred Bowles arrived at the mine about an hour later, they learned that there had been a methane explosion, rather than a roof fall.

Sixteen of the 20 men who had

---

*Then called the Mining Enforcement and Safety Administration (MESA).

been underground at the time of the explosion had managed to escape. Their reports of conditions within the mine did not paint an optimistic picture of the situation confronting the four missing miners, presuming they might still be alive.

Randy Fisher, who had been operating a battery-powered tractor about 1,200 feet from the origin of the blast, later said he had felt a strong concussion and was enveloped in coal dust so thick he could hardly see.

Edward Bryson, mine foreman, and two equipment repairmen who were 500 feet farther from the point of origin also felt the concussive shock wave and saw the dust cloud, and Lester Wade, a belt head attendant who had been 3,500 feet from the explosion source, later reported that he had been badly buffeted by the wind force which had blown down a ventilation check curtain and filled the belt line with dust. Miners described the explosion sound as a vibrating, piercing high-frequency sound.

After the explosion, production crew members led by foreman Bryson replaced blown-off mandoors and built temporary stoppings to direct ventilation air flow toward the explosion area more than a mile and a half from the portal in an effort to reach the four missing miners. The four had been repairing a continuous mining machine and working on a belt conveyor in an inactive section prior to removing them from the section, which had been abandoned because of bad roof and difficulties in working in low coal.

Monroe West arrived with others at the mine at 11:45 and took charge of MSHA's activities, including monitoring the fans and establishing a check-in-and-out system. West and Taylor entered the mine half an hour later. Reaching entries in the abandoned area where company employees were trying to restore ventilation controls, the MSHA officials used instruments to check the mine air. Finding concentrations of carbon monoxide, West ordered the workmen to withdraw from the mine. A fresh air base, which rescue and recovery workers could use as an operations base, was established in the mine's No. 1 Left entry, nine crosscuts from the face and between a mile and a mile and a half underground.

Miners on both the Westmoreland and Clinchfield rescue teams had been on vacation when the urgent calls came. Louis Hennegar, whose Westmoreland team had helped to recover victims of the Scotia mine disaster in Kentucky, recalled that "people had been mowing lawns, taking it easy, or shopping when the team captain came around in his car and told us about the accident."

The No. 1 and No. 2 teams from Westmoreland's Stonega division arrived at the fresh air base at 2:30 p.m. Captained by Jerry Fritz, the No. 1 team included Wendell Collinsworth, Hubert Kimberlin, Jr., Gerald Tate, Gale Francis, Ray Carnes and Hennegar. The No. 2 team, whose captain was Charles Barnette, was made up of members Ronnie Willis, Lloyd Robinette, Jr., Matt Smith, Allen Wolfe, Randy Barnette and Gary Crisp.

At 3:15 p.m., the No. 1 team left the fresh air base under oxygen to explore for fire or other ignition sources in the two adjacent crosscuts closer to the face. Later, the No. 2 team, also wearing oxygen breathing apparatus, built air locks (check curtains with built-in doors) in the explored area. After the area had been explored and cleared of harmful gases, the fresh air base was moved two crosscuts toward the face of the No. 1 entry.

During the move, W. R. Compton, then MSHA district manager at Norton, Va.; Ray Ross, then a supervisory mining engineer and now district manager at the Norton office; and representatives of the United Mine Workers of America and the Virginia Division of Mines and Quarries arrived at the fresh air base and aided in directing recovery operations.

The process of exploring, constructing air locks, and moving up the fresh air base was repeated until the explosion area was completely explored.

Through the afternoon and evening, company employees and volunteers from other operations loaded and unloaded supplies, manned and extended the communication system, repaired and improved ventilation controls, operated battery tractors to transport rescue workers and helped out in other ways. The battery-powered vehicles, used to haul people, brattice cloth, timbers, tools, nails and other equipment and materials needed to restore ventilation, support the roof and clear away debris functioned smoothly until the batteries ran down. This problem was solved by borrowing equipment, batteries and chargers from other mines.

The Clinchfield Coal Co.'s rescue team, designated Team No. 3 and led by captain Milton Kiser, arrived at the fresh air base at 7:03 p.m. Kiser and members Edward Coffey, Wayne Fields, Bobby Tompa, Steven Stewart, David Prater, Vernon Johnson and Neal Phillips aided in exploring the explosion area and clearing it of harmful gases.

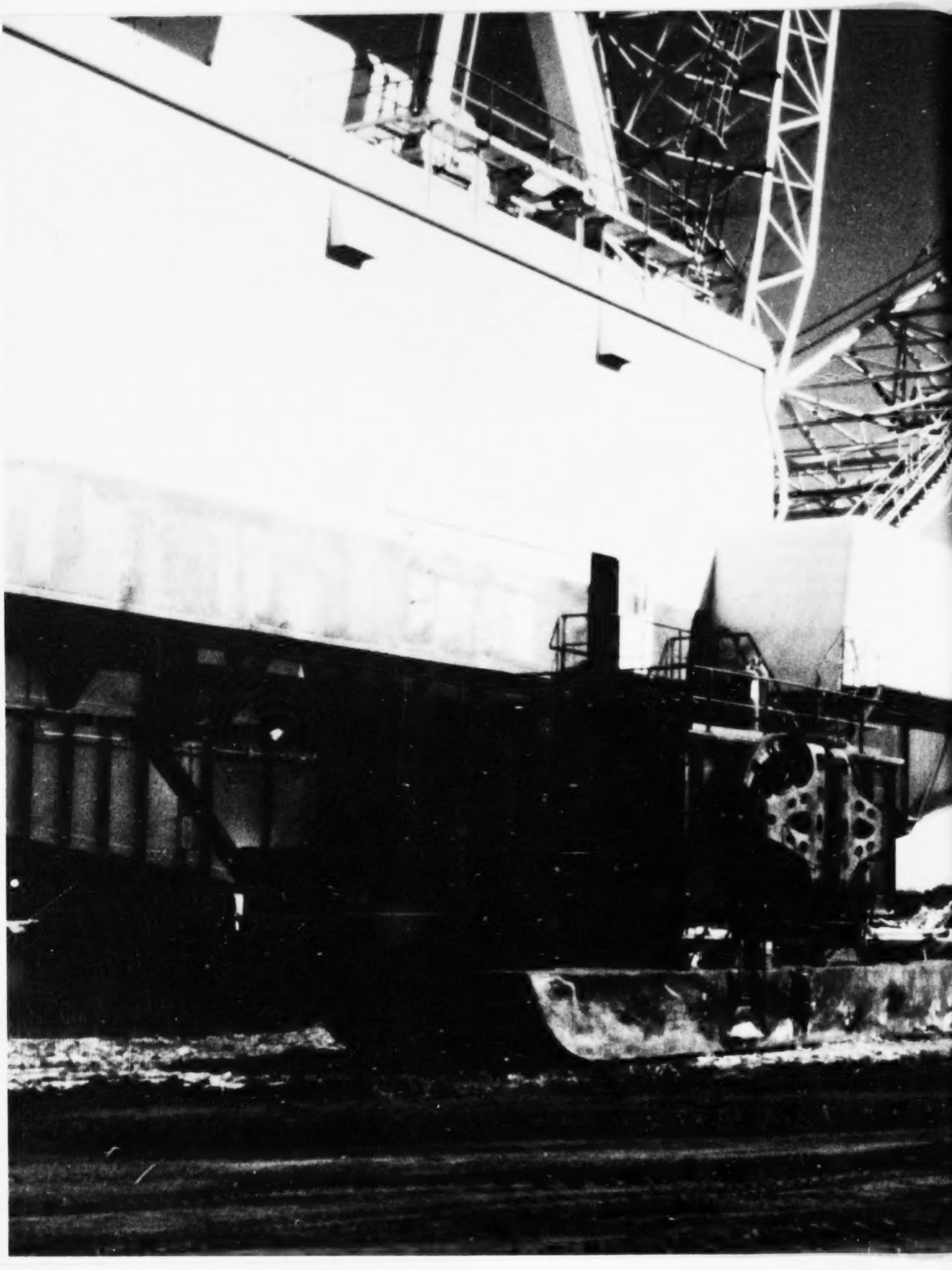
The No. 3 team reached the explosion scene only a short time after the No. 1 team had located the bodies of the four victims at about 8:30 p.m. about 125 feet from the face. The Clinchfield team then helped to recover the bodies.

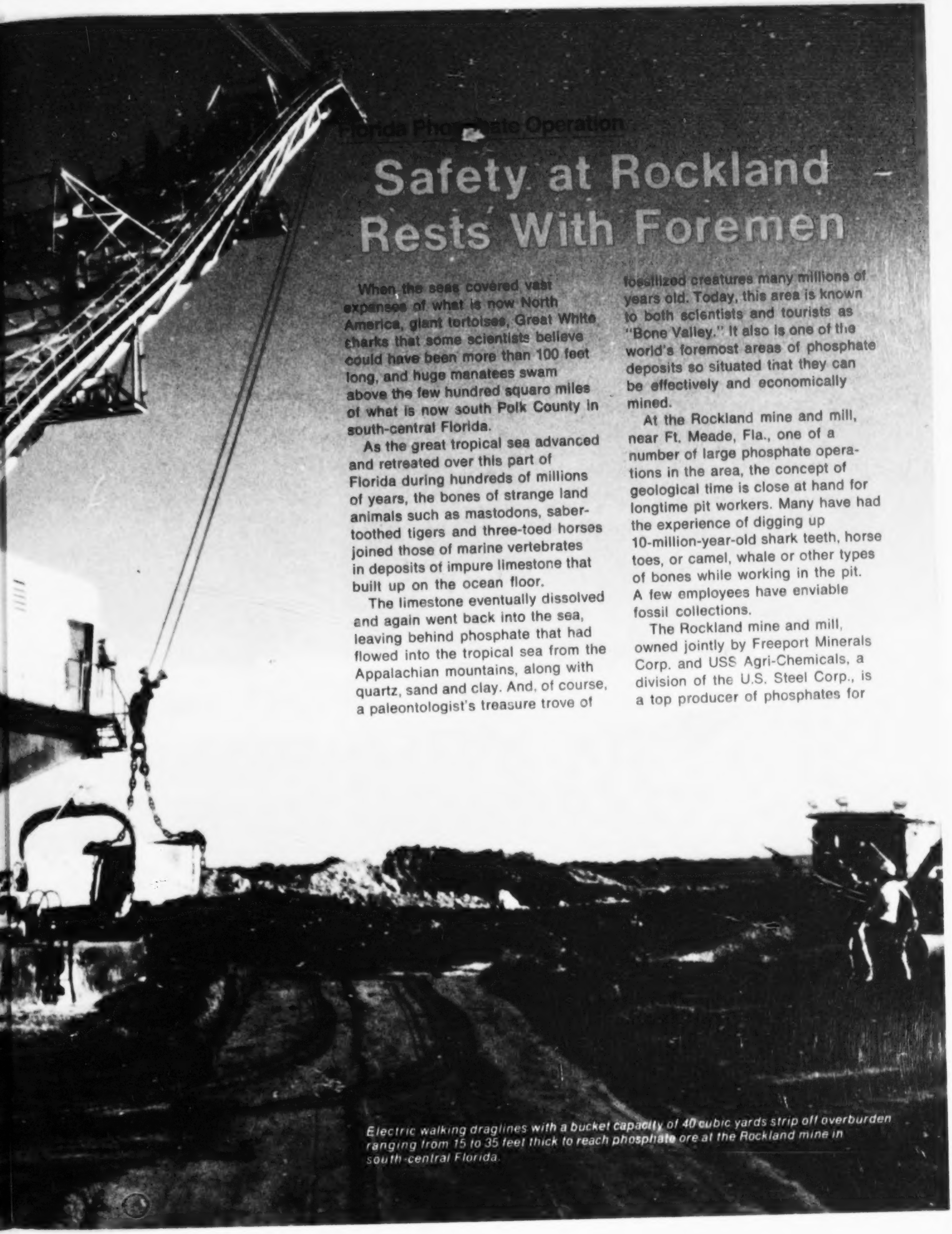
The victims were found near a parked mine car. The bodies of all of the men had been burned. An open cigarette lighter was found in the mine car. Investigators later concluded that mine ventilation and gas control practices had been inadequate at the mine and that the resulting explosive methane-air mixture had probably been ignited by the cigarette lighter.

During recovery of the victims at the grim explosion site, one rescue team member became ill and was taken back to the fresh air base.

"It doesn't bother you much for a day or two. When you're in the mine, you're thinking about the men you have with you and yourself. But afterward, it starts to bother you. You think a lot about what you saw," said Westmoreland's Phillips.

MSHA's Ray Ross summed up the activities of rescue team members and volunteer support workers who aided in the recovery effort this way: "When something like this happens, people freely donate their time and efforts. They are just fantastic."





Florida Phosphate Operation

Safety at Rockland Rests With Foremen

When the seas covered vast expanses of what is now North America, giant tortoises, Great White sharks that some scientists believe could have been more than 100 feet long, and huge manatees swam above the few hundred square miles of what is now south Polk County in south-central Florida.

As the great tropical sea advanced and retreated over this part of Florida during hundreds of millions of years, the bones of strange land animals such as mastodons, saber-toothed tigers and three-toed horses joined those of marine vertebrates in deposits of impure limestone that built up on the ocean floor.

The limestone eventually dissolved and again went back into the sea, leaving behind phosphate that had flowed into the tropical sea from the Appalachian mountains, along with quartz, sand and clay. And, of course, a paleontologist's treasure trove of fossilized creatures many millions of years old. Today, this area is known to both scientists and tourists as "Bone Valley." It also is one of the world's foremost areas of phosphate deposits so situated that they can be effectively and economically mined.

At the Rockland mine and mill, near Ft. Meade, Fla., one of a number of large phosphate operations in the area, the concept of geological time is close at hand for longtime pit workers. Many have had the experience of digging up 10-million-year-old shark teeth, horse toes, or camel, whale or other types of bones while working in the pit. A few employees have enviable fossil collections.

The Rockland mine and mill, owned jointly by Freeport Minerals Corp. and USS Agri-Chemicals, a division of the U.S. Steel Corp., is a top producer of phosphates for

Electric walking draglines with a bucket capacity of 40 cubic yards strip off overburden ranging from 15 to 35 feet thick to reach phosphate ore at the Rockland mine in south-central Florida.

agricultural fertilizer and industrial chemical products sold throughout the world. In recent years, the company has several times received recognition for having outstanding employee safety records.

In July 1979, the mine and mill workforce reached a cumulative one million employee-hours worked without a lost-time accident. At the end of 1980, the record was 1,750,282 hours worked safely.

Employees of the Rockland mine alone won the Sentinels of Safety trophy for the second consecutive year in 1980 for having the best safety record—545,992 employee hours worked without a lost-time injury—among U.S. open-pit metal and nonmetal mines. The Sentinels of Safety competition is sponsored by MSHA and the American Mining Congress.

Workmen change out a valve atop an ammonia tank car. Much manual work is required at the Rockland mine and mill and the safety program reflects this.

During 1981, according to MSHA records, the Rockland mine had an extremely low lost-time injury rate of .37 injuries per 200,000 employee-hours worked. This was the result of one lost-time injury, a twisted knee, suffered by a worker when he stepped on soft ground that had been undercut by water. Mill employees, while working many fewer hours than the mine workers, had no lost-time injuries during 1981.

The Rockland mine and mill, along with the USS Agri-Chemicals' chemical plant, also have received other safety awards during the past six years, including many from the National Safety Council.

Mining is done at the Rockland mine using two 1,600-ton Bucyrus-Erie electric walking draglines, a Model 1260 with a bucket capacity of 40 cubic yards of material and a Model 1250B having a bucket capacity of 38 cubic yards.

To reach the ore, or matrix, consisting of about equal parts of phosphate, clay and sand, the draglines must strip off the overburden of beach sand that was deposited in the area when the sea receded several hundred centuries ago. The overburden generally is between 15 and 35 feet thick.

The dragline places phosphate material in a pit where it is disintegrated by high-pressure water "guns" into a slurry and transported by pipeline to the plant. Because the area mined is as far as four miles away from the plant, six 1,500-horsepower pumps are used to maintain flow of the slurry.

The upgrading of phosphate material to improve the quality of the ore by regulating its size, concentrating it, and removing unwanted constituents—a process called "beneficiation"—is achieved by a combination of washing, crushing, screening and dewatering cycles.

At the beneficiation plant, the ore is processed to remove clay and sized to produce "pebble product" containing material smaller than three-quarters of an inch and larger than one millimeter in diameter, which requires no further beneficiation before use as a chemical plant feed, plus a mixture of fine particle phosphate sand. The smaller-grained material from which most of the clay has been removed is used as flotation plant feed which is cycled through 100-cubic-feet, six-pocket flotation cells. Phosphate particles are concentrated by froth flotation and overflow the top of the cell. Clay and sand removed during the separation process are returned to mined-out areas to be used in land reclamation and dam building. The main sales product of the operation is phosphate in its various marketable forms such as phosphoric acid for use in fertilizers.

After its acquisition of the Florida phosphate operation 13 years ago, U.S. Steel Corp. management moved vigorously to bring the operation up to the parent corporation's high training standards. In the mid- and late 1970s, the safety program was strengthened and safety training and supervisors' accountability for the safety of workers were reemphasized.

The strong role of front-line supervisors in enforcing safe practices, along with formal safety training and cooperative union-management safety activities, played an important part in Rockland's safety achievements in recent years, according to Jack Lowery, plant manager of the Rockland mine and mill.

"Safety first has always been our official position at this operation," Lowery said "Our program is based on the foreman's understanding that he is responsible for safe work practices by the people he supervises. Our front-line supervisors are very conscious of safety and safety records."

Ray Loupe, supervisor of safety for the USS Agri-Chemicals division, based in Florida, said that the safety

Plant manager Lowery emphasizes supervisors' safety accountability.

program of the Rockland mine is based on the U.S. Steel Corp.'s longstanding accident-prevention guidelines as those have been specifically adapted to phosphate mining conditions in Florida.

An "awareness chart" in Loupe's office contains continually updated information about the safety performances of the Rockland Mine and other Florida operations.

"The chart is useful in identifying accident trends and pinpointing the causes of injuries," Loupe said. "From looking at it, we can tell who the supervisor is in each area, how many accidents and injuries there have been in each area, how many accidents and injuries there have been during a certain period among the people he supervises, the types of accidents and injuries occurring, and the worker's compensation medical expenses incurred in the supervisor's area of responsibility. This way, we can tell when the number of injuries, say to fingers or backs start to go up, and we can concentrate on reducing the kinds of accidents in which they occur."

Even though the Rockland mine is an open-pit operation, Jack Lowery pointed out, much of the work done there every day is potentially dangerous.

One potentially hazardous activity is the laying of heavy, 20-inch-diameter pipe. Many miles of pipe must be laid continually to carry slurry from the mine to the plant. As a dragline mines one area and moves to another, pipeline sections are picked up, moved and reinstalled at the new pit site. The pipeline crew and crane operator must closely coordinate the work to prevent accidents in which workmen are injured by falling pipe or fittings or suffer crushed arms, legs, fingers or feet in pinching-type accidents.

Much high-powered electrical equipment is used at the USS Agri-Chemicals site, and enforcement of requirements on locking out machinery before starting maintenance or repair work and on the care, maintenance and inspection of high-voltage trailing cables has especially high priority.

Rockland employees intermittently must use elevated walkways and ladderways or do maintenance work on parts of conveyor systems, cranes or draglines high above the ground where there is a possibility that the workman may slip and fall or drop tools or equipment on others below. This topic is frequently covered in safety meetings and training sessions.

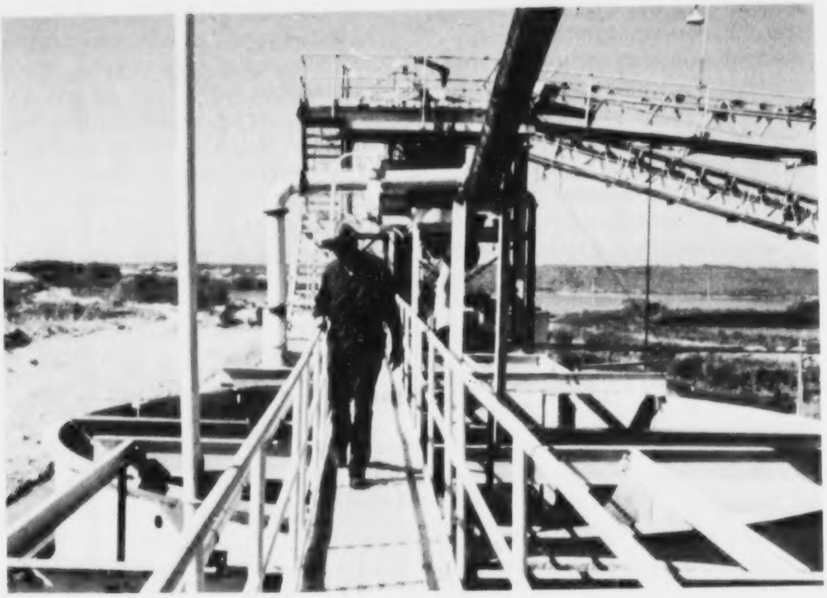
Mobile equipment safety is another subject that is strongly emphasized by management. Big front-end loaders and bulldozers are required in the pit, and the machines have long been equipped with rollover protective structures, backup beeper alarms, and seat belts. According to Lowery, there have been no reportable accidents involving bulldozers since the mine has been a U.S. Steel operation.

As of June 1976, the workforce at USS Agri-Chemicals' entire south central Florida operation—mine, mill and chemical plants—passed 4 million employee-hours without a disabling injury, covering a 2½-year period.

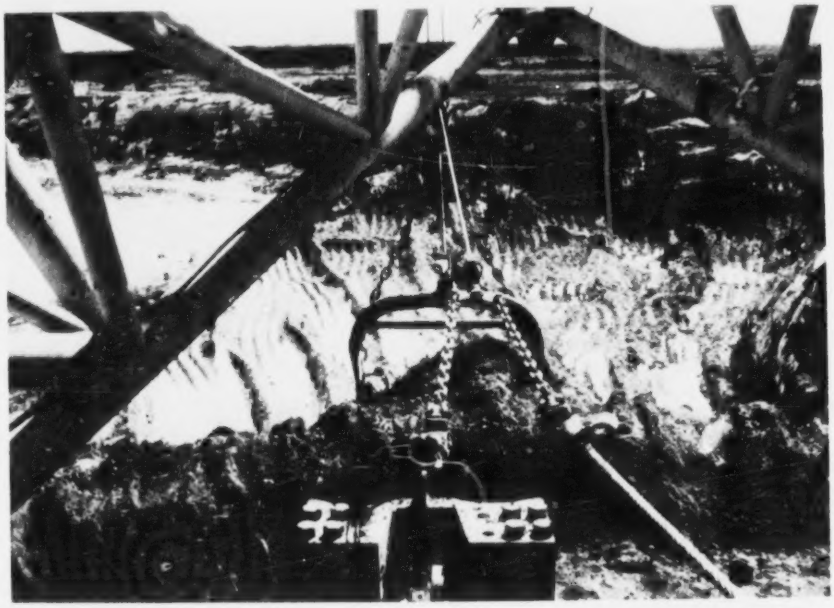
That year, however, a workman was killed when a truck that was backing up crushed him against a piece of equipment. There have been no fatal accidents since then.

"We had to feel that there was something in our safety program that we weren't doing right anymore, maybe the kind of complacency that comes with having a real good safety

Shown above is part of the phosphate chemical complex of USS Agri-Chemicals, a division of the U.S. Steel Corp., at Bartow, Fla.



Fred Hammermeister, a union safety committeeman, tours a walkway along a wet storage bin at the Rockland mine. Most safety complaints, he said, are resolved at the foreman level.



The dragline boom and bucket, shown during excavation. Ore moves through pipelines as slurry to the processing plant. Pipes are moved frequently, presenting hazards.

record month after month," Jack Lowery said, "so we took a closer look at the things we were doing."

The company subsequently re-evaluated its safety program, strengthened the safety staff, and further expanded company safety inspections and training activities as well as cooperative safety and health activities with the union, Local 337, International Chemical Workers Union.

A key part of the safety program at the Rockland mine is an employee safety committee which represents four mine activities—electrical maintenance, equipment maintenance, production and support services.

Fred Hammermeister, a safety committeeman, said, "The safety committee is pretty active, and individual workers are not afraid to come to us with safety complaints or suggestions. Most of the time, the problems have been resolved at the foreman level."

Buford Ross, Rockland field superintendent, has a quiet manner and an effective working relationship with the men he supervises.

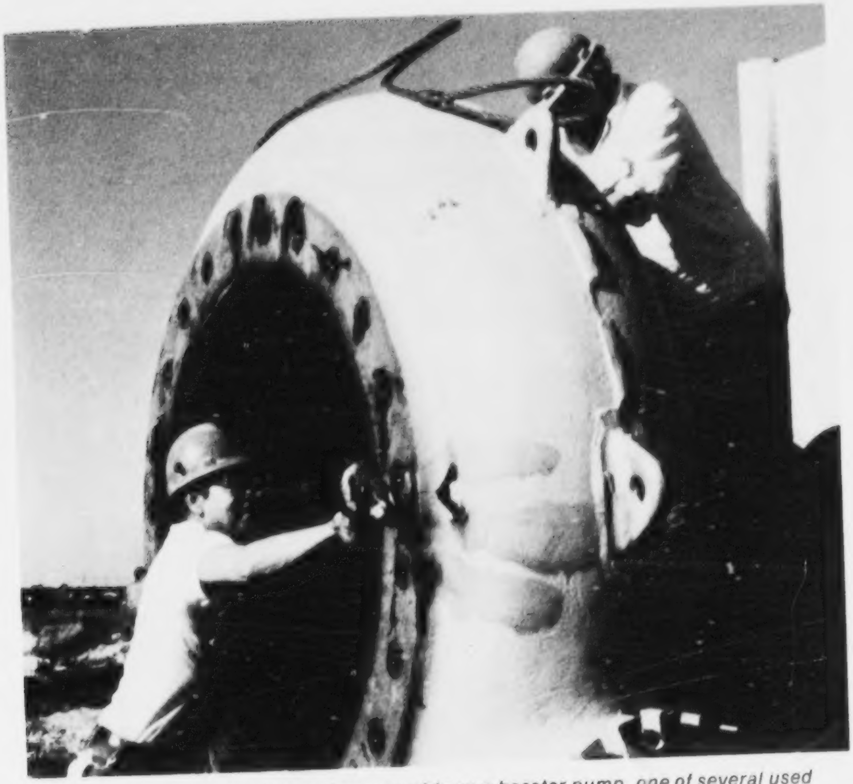
"Anyone with a safety or health complaint goes to his foreman first," Ross said. "If it's a real safety problem, we do everything possible to have the situation corrected. The foreman has this responsibility because he is the person closest to the situation."

If the safety issue cannot be resolved to the satisfaction of both management and labor, it may be brought before a committee of superintendents at a monthly meeting held to discuss the general safety program.

At this meeting, four employee safety committee members report on safety or health problems in their areas. If a certain foreman is not holding the required weekly departmental safety meetings with hourly workers to discuss specific mine hazards, safe work methods, or recent accident causes, the fact is noted for further action. The same is true when the superintendents' committee has reason to believe that an improper work practice has not been ended after a valid complaint has been made.

Participants at the labor-management committee meeting make up checklists of remaining safety problems at the operation that should be followed up. The lists are used by company safety inspectors, and the committee later gets reports showing the disposition of each case.

"We're not interested in placing blame at these meetings," said Jack Lowery. If somebody's doing something wrong, we want to get the situation corrected as soon as we can, so we can stick to safety subjects at the meetings, not personalities."



A Rockland crew replaces a bearing assembly on a booster pump, one of several used to move slurry through 20-inch pipelines to the plant several miles away.

He added, "The majority of complaints we get are about problems with equipment, but in the 10 years I've been here, I can't recall any failure of equipment that caused a serious accident."

Lowery said that, while the Rockland operation is highly mechanized, "probably 65 percent of the work done is manual labor so we concentrate on hazards common to this type of work in our safety program."

Referring to the accident during 1981 in which a pit worker stepped into a hole in mushy ground and twisted his knee, Lowery said, "That's the kind of accident that's very frustrating to all of us. It's like something that could suddenly happen when you were out hunting. But many of the accidents we have had over the years have been similar to this one. They have involved people moving from place to place on foot or doing some job manually so these are the kinds of accidents we have stressed in our safety training and hazard awareness program."

The success of the accident prevention program, Lowery believes, rests to a large extent on daily "safety communications" between supervisors or safety office personnel and workers and between two or more hourly employees.

These safety communications might consist of actual instructions given in safe operation of a piece of equipment, of "tailgate" meetings of a foreman and shift workers, or the simple act of a supervisor or fellow workers telling another employee to wear personal protective equipment or to be especially careful when working in a certain mine area where the ground is unstable.

Lowery said, "These communications are called 'safety contacts,' and form the backbone of our safety training efforts on a daily basis. The safety office staff operating under divisional and corporate safety program guidelines emphasizes a minimum requirement that there will be at least one such safety contact per week recorded for each employee, and that a record be kept of the training provided.

"These records, along with the employee's work background and accident-injury history, if any, and the task training and MSHA-required safety training received by the employee then makes up the basis for planning future training."

Diane Knox, of the safety office, who is an MSHA-certified safety training instructor, conducts training classes. "She is enthusiastic about safety," said Bill Collins, employee relations manager for USS Agri-Chemicals' Florida operations, "and she's doing a terrific job for us."

When the safety staff first started giving the required training and retraining several years ago, it learned, as many training officials have learned at other operations, that there were some communications gaps among the various levels of company personnel that most people hadn't been aware of before.

"For example," said a safety specialist who had been on the staff at that time, "we were training supervisors to be sure their people locked out electrical equipment properly before doing maintenance or repair work, but when we had

Buford Ross, field superintendent of the Rockland mine: "If it's a real safety problem, we do everything to have the situation corrected. The foreman has this responsibility..."

A view of conveyor belts to the east wet rock pile, one of the later stages in the processing and stacking of phosphate material before it is transported to the USS Agri-Chemicals division's chemical plant.

classes for the employees, we found that they didn't know what to do.

"What was happening was that foremen were telling their people to get the proper locks, cables and tags before starting work, but apparently no one realized that a worker had to get these things from several widely scattered shops and offices. We weren't making it very easy for an employee to be safe. So we made sure all the lockout materials were kept in the same handy place after that."

He added that long safety records seem to develop their own momentum, a finding that has been made over the years by other safety specialists.

"When you've got a good record going and people have worked for hundreds of thousands of hours since the last lost-worktime accident, nobody wants to be the one who breaks it," he said.

"That's when the buddy system really works. People at all levels get involved. The safety record you're working on gives people a ready-made excuse to say something to anyone they see doing something unsafe on the job."

To many at U.S. Steel's Rockland mine and mill, the goals of safety and cost-effective phosphate production are not incompatible.

"Being safe hasn't hindered production," said Jack Lowery, the plant manager. "We've bettered our production standard every year between 1976 and 1981—and these were years when we were also setting some safety records."

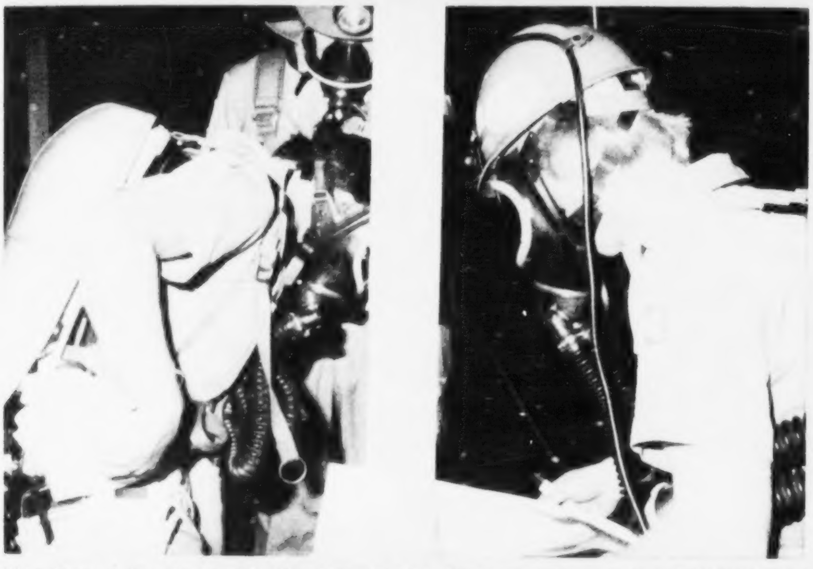
An electrician-instrument technician blows dust from an electric motor as part of regular equipment maintenance duties at the Rockland operation.

The poster on the opposite page is designed to encourage miners to observe and work toward improved safety practices. The poster which was created by Art Director Columbus P. Knox, can be cut out of this issue and placed on bulletin boards or at other locations regularly passed by working miners.

SAFETY
TRAINED

An International Salt Co. mine rescue team from Retsof, N.Y., administers to a "victim" during recent national rescue contest.

Stauffer Big Island Mine Team Tops '82 Rescue Competition



Members of the winning Stauffer Chemical Co. team consult a map in a simulated mine.

A mine rescue team from the Stauffer Chemical Co.'s Big Island Mine at Green River, Wyo., was awarded the first-place trophy at the 1982 National Metal and Nonmetal Mine Rescue Contest held in Las Vegas on Aug. 18.

The Big Island Mine team was the only one of the 24 top teams competing to perform a complex mine rescue "problem" without making a mistake.

Since the last national metal and nonmetal rescue contest in Dallas two years ago, members of the competing teams have spent many gruelling hours in training, both underground and on the surface.

On the day of the contest, competitors had begun assembling in the East Hall of the Las Vegas Convention Center before 6 a.m. to check their equipment and once again

Focus

The captain of Union Carbide's Sunday Mine team leads members through an airlock. They took fourth place in the contest.

review proper rescue and recovery procedures.

Shortly after 7 a.m., all teams were quartered in a large isolation room where they patiently awaited their turns to enter one of five 82-by-190-foot simulated mines assembled in the cavernous East Hall. The isolation is standard procedure to prevent team members who have already competed from discussing specific problems the teams must solve with those who have not yet competed.

At 8 a.m., the captain of the first team to run the course, an FMC Corp. team from Green River, Wyo., gave the command, "Prepare to go under oxygen"; the team, wearing self-contained breathing apparatus and face masks, entered a mine, and the ardous competition was under way.

The five-person teams were judged on performance under pressure of a practical mine rescue and recovery problem representing, to the extent possible, the conditions a team would encounter during an actual mine fire or other mine emergency.

This year, among other problems each team had to contend with were flooding and fire in the mine, the necessity for crawling in confined spaces, the need to rebuild ventilation controls, and the rescue of an unconscious miner and recovery of other miners' bodies.

Besides "underground and "surface" activities, the teams were judged on their preparation of a map showing the precise condition of the mine during the simulated emergency. Another part of the competition was a written test completed by team members. Gas boxes were set up for the teams' testing of carbon monoxide, methane, nitrogen dioxide and oxygen deficiency, using the appropriate monitoring devices.

Points were deducted from a team's score for making faulty decisions in specific rescue situations, for making errors in mapping or on the written or gas tests, and for exceeding the average time it took to solve the problem.

The winning Stauffer Chemical Co. team had no points deducted, a rare achievement in contest history. The competition was very close, however, with only one deduction point separating the winner from the second-, third- and fourth-place finishers.

Final rescue contest results by order of finish were:

1. Stauffer Chemical Co., Big Island Mine, Green River, Wyo., Team members and alternates: Gary Gomez (Captain), Ron Braden, Rick Terry, Steve McKinlay, Chuck Jones, Alvin Moore, Gary Grinolds, Mike Pond, and Jim Trafton (Team Trainer);

MSHA's Graham Harvey, center, checks out benchmen on equipment care and repair.

2. Morton Salt Co., Grand Saline Mine, Grand Saline, Texas;
3. Cities Service Co., Copperhill Operations, Copperhill, Tenn.;
4. Union Carbide Corp., Sunday Mine Team, Uravan, Colo.;
5. Cominco American, Inc., Magmont Mine, Bixby, Mo.; and
6. Texasgulf, Inc., Granger Mine, Granger, Wyo.

Both Stauffer Chemical's Big Island Mine team and Cities Service's Copperhill Mine team have been among the top three finishers in the past two national contests. Besides Stauffer Chemical's Jim Trafton, other trainers are: William Blanchard, Morton Salt, Grand Saline; Billie Wayne Chastain, Cities Service, Copperhill; Wayne Wancura, Union Carbide, Sunday Mine; Leo Bradshaw, Cominco American, Magmont Mine; and Douglas Malicoat, Texasgulf, Granger Mine.

MSHA awarded trophies to the winners of the Benchman Contest, a separate competition which tested the skill of each team's benchman in the vital job of checking and repairing rescue equipment.

The winners were:

1. Art Davis, Amax, Inc., Henderson Mine, Empire, Colo.;
2. Mike Pond, Stauffer Chemical Co., Big Island Mine, Green River, Wyo.;
3. Floyd Alvey, Rio Algom Corp., Lisbon Mine, Moab, Utah;
4. Herb Clark, Cominco American, Inc., Magmont Mine, Bixby, Mo.

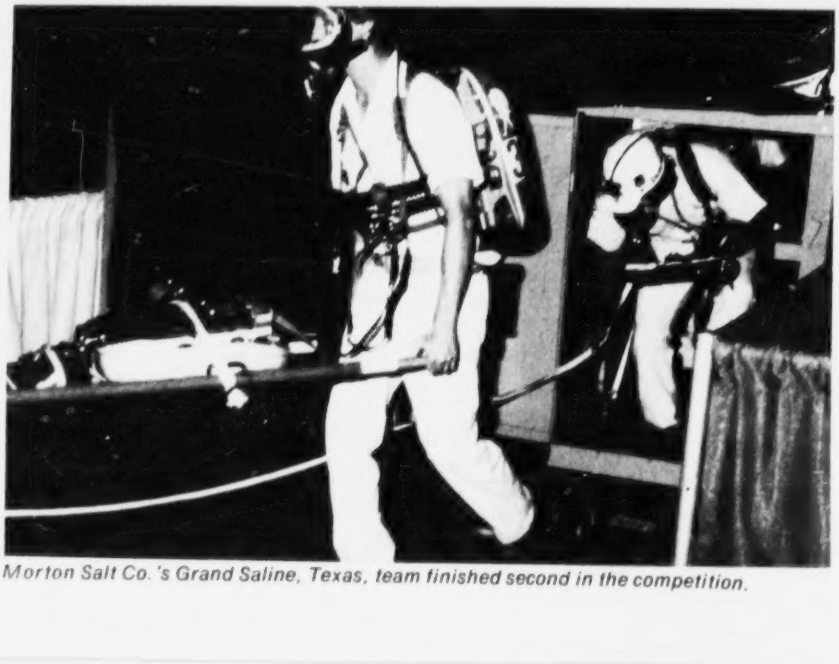
At an awards banquet, MSHA Assistant Secretary Ford B. Ford told the volunteer rescue team members, ". . . You may be sent where things are the toughest, dirtiest and most dangerous, but you will know that the reason you are there is because you are the best-trained, the best qualified, and hopefully, the best motivated . . .

"Your reward will be the noblest and richest of all possible incentives—the knowledge that your efforts may some day directly contribute to the saving of human lives—the lives of neighbors, buddies, possibly even fathers or brothers working in the mines. I respectfully salute you."

MSHA's Role At Aggregates Sites Resumes

On July 18, more than seven months after the Congress prohibited MSHA from spending funds to inspect or in any manner regulate about 12,000 surface stone, clay, sand and gravel and colloidal phosphate mining operations, Congress lifted the restrictions and MSHA resumed its safety and health role at such operations.

Jurisdiction of MSHA over the aggregates and colloidal phosphate operations was restored by the Congress in House Resolution 6685. MSHA had been barred from spending funds to enforce provisions of the Federal Mine Safety and Health Act of 1977 at the various surface operations as the result of con-



Morton Salt Co.'s Grand Saline, Texas, team finished second in the competition.

gressional appropriations action taken in December 1981.

The resolution passed in July continues to prohibit MSHA from regulating any mining operation of a state or local government subdivision, as did the language of the December 1981 legislation, and H.R. 6685 also prohibits MSHA from using appropriated funds to classify any potash mine as gassy based on air samples containing methane concentrations unless such classifications standard has been adopted through formal rulemaking after Nov. 5, 1981.

Since July 18, MSHA's field managers, inspectors and training specialists have met frequently with mine operators, union representatives, miners and state officials to bring them up to date on changes in regulations and administrative changes in civil penalty, training and other policies and procedures that have been made during the period when MSHA was without jurisdiction at the surface aggregates operations.

Policy Issued On 8-Hour Retraining

In response to requests from the mining community that MSHA review its requirements for annual eight-hour refresher training of miners, MSHA has formalized its policy relating to flexibility of the requirements.

The policy memorandum that follows is being sent to MSHA field managers, mine operators, labor organizations, mining associations and other interested groups and individuals.

Title 30, Code of Federal Regulations, Parts 48.8 and 48.28 require that each miner receive a minimum of eight hours annual refresher training and that such training include specific courses of instruction. A primary purpose of the refresher training requirements is to assure that safety and health aspects of miner training are reviewed annually.

MSHA recognizes that an effective refresher training program must adapt to changing mining conditions, accident history and other training concerns. Time spent for each course may vary to meet specific needs. Accordingly, the following policy is adopted for approval of training plans with respect to provisions for annual refresher training:

(a) The annual required refresher training courses listed in 30 CFR 48.8 and 48.28 that are not applicable to a particular mine may be omitted from its training plan. A notation of which courses are not applicable must appear in the training plan. In the exceptional situation where a course is applicable to the mine but not to a particular miner, the miner is not required to receive that course.

(b) An 8-hour minimum is required for the total annual refresher training program. However, the time spent on individual courses may vary from year to year or from one area of the mine to another depending on specific safety or health problems encountered. For example, the mine's accident experience should significantly determine the amount and type of training miners receive throughout the year.

(c) All applicable refresher training courses listed in the approved training plan are to be performed during each 12-month cycle. However, two or more of the courses may be covered in one training session or safety meeting. For example, a well-structured safety meeting may cover ground control, safety standards, prevention of accidents and other topics without the necessity of separate blocks of instruction.

(d) Safety meetings of at least 30 minutes duration and conducted by an approved instructor are acceptable training sessions that satisfy the annual refresher requirements.

Training plans may be revised to reflect mine training needs. Requests for revisions should be submitted in writing, to the MSHA District Manager in the geographical area where the mine is located (30 CFR, 48.3 and 48.23).

Persons with inquiries should contact: John C. English, MSHA Educational Policy and Development, Arlington, Va. (703) 235-1515.

Academy

Continued from Page 9

changes, expanded the role and responsibilities of the agency's district officials for safety and health education and training and gave the field managers new functions involving the holding of health and safety conferences on citations that have been issued when conferences are requested by mine management or miner representatives (see the article on page 2 for a more detailed discussion of these changes).

English answered questions on MSHA's changing safety training role, which involved shifting training responsibilities and training specialists from 10 training centers to MSHA district offices. He said, "I see education and training under the reorganization as a broadening of our capabilities rather than as a diminution of our (training) role."

Workshop topics included: methods of improving communications of safety issues, the use of training specialists at mine sites, ways of getting better access to up-to-date training materials and methods, the role of the Academy, and the uses of Bureau of Mines' safety and health research findings and MSHA's technical support capabilities.

Following lively and sometimes heated workshop discussion sessions, John Gray, of the Island Creek Coal Co., said, "We had a fine session. I've never been at a discussion meeting where so many people had so many fine ideas."

A number of conference delegates called for a restudy of MSHA's training regulations to determine

Walter Gray, left, Island Creek Coal Co., and Mike Trainor, MSHA, discuss suggestions for improving cooperative safety efforts during the joint meeting at the Academy.

whether more flexibility should be allowed in meeting the eight-hour annual retraining requirements. Assistant Secretary Ford promised to take a hard look at ways of making the required retraining more relevant to changing safety and health conditions at the mines and the specific training needs of operators and miners, and MSHA's policy on annual retraining has since been clarified in a memorandum

Post-conference comments by participants included these:

"Make sure that this attitude of cooperation and this non-adversary position is pushed through (MSHA's) district offices and to local offices, or there will be continued mistrust and fighting";

"The conference put adversaries together for a couple of days. After a while, most of them started talking to each other";

"Stress subjects which get into supervisor and miner training in areas of attitude, motivation, safety awareness, (and) safety management. This is a field we need to concentrate on if significant progress in accident reduction is going to be realized . . .";

"This conference was a good start."

In recent months, MSHA officials have frequently exchanged views on safety issues and regulatory procedures with representatives of industry, labor, state government, and mining schools at other conferences and seminars, including the Kentucky Coal Conference, the Coal Mine Health, Safety and Research Institute, the United Mine Workers of America's Safety Seminar, the Mine Inspectors' Institute of America, a conference of the National Association of Mine Inspection Agencies, the American Mining Congress's regional seminars and meetings of the Associated General Contractors of America and several state mining associations, among others.

Mines With Top 1981 Records Awarded Trophies

Six mines recently were awarded Sentinels of Safety trophies for achieving the top safety records in annual competition sponsored by the Mine Safety and Health Administration and the American Mining Congress.

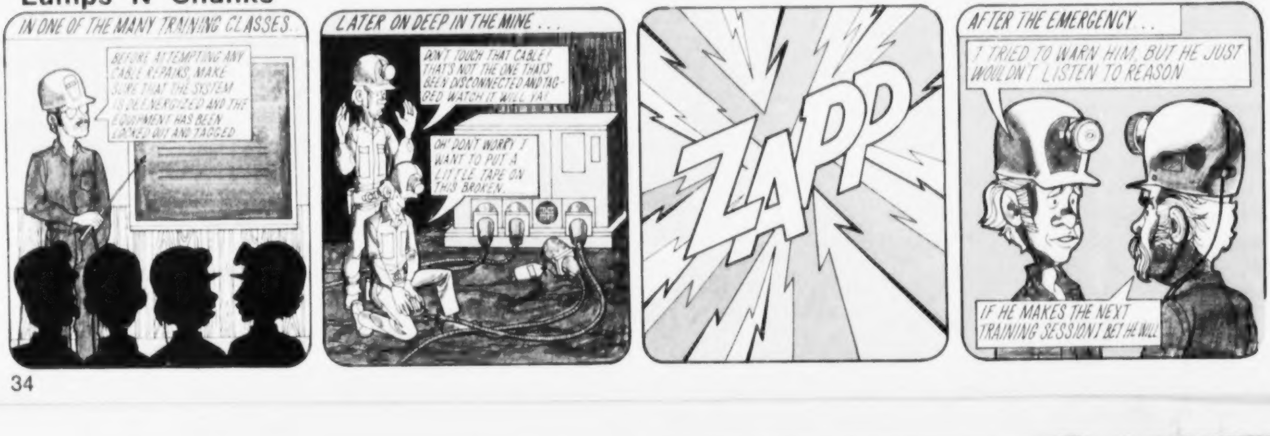
The mines, which were winners in six categories—underground coal, surface coal, underground metal, underground nonmetal, and open pit mines, and open pit quarries—will receive bronze Sentinels of Safety statuettes at formal ceremonies. Congratulatory letters have been sent to the winning mining companies, and safety certificates have been awarded to employees of the winning teams.

In a separate category of competition sponsored by MSHA, two sand and gravel operations were honored with awards for their outstanding safety achievements.

The competition was open to U.S. mines whose reported employment data for each active operating period during the year showed that the mine had achieved at least 30,000

Lumps 'N' Chunks

Drawn by C. P. Knox



IN ONE OF THE MANY TRAINING CLASSES.
BEFORE ATTEMPTING ANY CABLE REPAIRS, MAKE SURE THAT THE SYSTEM IS DE-ENERGIZED AND THE EQUIPMENT HAS BEEN LOCKED OUT AND TAGGED
LATER ON DEEP IN THE MINE . . .
DON'T TOUCH THAT CABLE! THAT'S NOT THE ONE THAT'S BEEN DISCONNECTED AND TAGGED WATCH IT WILL YA!
OH' DON'T WORRY I WANT TO PUT A LITTLE TAPE ON THIS BROKEN.
ZAPP
AFTER THE EMERGENCY . . .
I TRIED TO WARN HIM, BUT HE JUST WOULDN'T LISTEN TO REASON
IF HE MAKES THE NEXT TRAINING SESSION I BET HE WILL

News and Notes

employee work-hours without an injury resulting in a lost workday.

MSHA identifies the eligible mines and requests that each operator verify its employment and injury data recorded in MSHA files. Certificates of achievement in safety are then awarded to mining operations meeting the contest's requirements. The top mines are those with the highest number of safe employee working hours.

The first-place winning mines with injury free status (no lost workdays) in the Sentinels of Safety program are:

Underground Coal Mines—Jericol Mining Inc., Holmes-Mill, Ky.—First Place Winner (No. 1 Darby Mine); Other Top-Ranking Mines: Itmann Coal Co., Itmann, W. Va. (Itman No. 2 Mine); Consolidation Coal Co., Beckley, W. Va. (Rowland No. 9 Mine); Jericol Mining, Inc., Holmes-Mill, Ky. (Glenbrook Mine); and Golden Glow Coals, Inc., No. 3 Mine, Harlan, Ky. (No. 3 Mine);

Surface Coal Group—Consolidation Coal Co., Stanton, N.D.—First Place Winner (Glenharold Mine); Other Top-Ranking Mines: Decker Coal Co., Decker, Mont. (West Decker Mine); Amax Coal Co., Brazil, Ind. (Chinook Mine); Utah International, Inc., Craig, Colo. (Trapper Mine); Carbon Coal Co., Gallup, N.M. (Mentmore Mine);

Underground Metal Mines—St. Joe Minerals Corp., Viburnum, Mo.,—First Place Winner (Brushy Creek Mine); Other Top-Ranking Mines: Union Carbide Corp., Egnar, Colo. (Deremo-Snyder Mine); New Jersey Zinc Co., Thorn Hill, Tenn. (Idol Mine); Atlas Minerals Co., Green River, Utah (Probe Mine); Union Carbide Corp., La Sal, Utah (Hecla Shaft Mine);

Underground Nonmetal Mines—Duval Corp., Carlsbad, N.M.—First Place Winner (Nash Draw Mine); Other Top-Ranking Mines: United States Gypsum, Co., Shoals, Ind. (Shoals Mine); United States Gypsum, Co., Sperry, Iowa (Sperry Mine); United States Gypsum, Co., Saltville, Va. (Cove Mine); Calcium Carbonate, Quincy, Ill. (Quarry No. 1 Mine);

Open Pit Mines—Occidental Chemical Co., White Springs, Fla.—First Place Winner (Suwannee River Mine); Other Top-Ranking Mines: E. I. Dupont DeNemours and Co., Starke, Fla. (Dupont Florida Mine); Agrico Mining Co., Mulberry, Fla. (Fort Green Mine); Candelaria Partners, Mina, Nev. (Candelaria Mine); Lithium Corp. of America, Bessemer City, N.C. (Hallman-Beam Mine);

Open Pit Quarries—Traprock, Industries, Inc., Kingston, N.J.—First Place Winner (Kingston Quarry); Other Top-Ranking Open Pit Quarries: Lone Star Industries, New Hamburgh, N.Y. (Clinton Point Quarry); Allied Corp., Jamesville, N.Y. (Jamesville Quarry); Southwestern Portland Cement Co., Victorville, Calif. (Black Mountain Quarry); Genstar Stone Products Co., Frederick, Md. (Frederick Quarry);

A Word on Our Break In Routine

As can be seen, reports of the demise of Mine Safety and Health magazine are greatly exaggerated, to borrow a line from Mark Twain.

After an absence of seven months, we are happy to be back in business. The reason for our failure to publish during the period was that a publications moratorium had been put into effect while the need for various Federal publications was being studied. Recently, this magazine was approved for continued publication.

Rather than coming out bimonthly, however, we will be published quarterly, as Spring, Summer, Fall and Winter issues.

We regret the inconvenience to readers, as well as to librarians who must cope with a gap of several issues in our files due to the moratorium. Thus, oddly, this issue has been designated Volume 7, Number 4, even though Nos. 1, 2, and 3 do not exist. The next—Winter 1982-83—Issue will be Volume 8, Number 1; the Spring 1983 Issue will be Volume 8, Number 2, and so on.

MSHA SAND AND GRAVEL AWARDS

Sand and Gravel Dredge—Standard Sand and Silica Co., Davenport, Fla.—First Place Winner (Standard Mine); Other Top-Ranking Sand and Gravel Dredges: Gifford-Hill and Co., Inc., Eagle Lake, Texas (Plant No. 68); American Sand and Gravel Co., Hattiesburg, Miss. (Glendale Operations Mine); Bark's Sand and Gravel Co., Merryville, La. (Allen's Pit); Winter Brothers Materials Co., St. Louis, Mo. (Winter Brothers Dredge and Plant);

Sand and Gravel Open Pit—Genstar Stone Products Co., Baltimore, Md.—First Place Winner (White Marsh Plant); Other Top-Ranking Sand and Gravel Open Pits: Gifford-Hill and Co., Inc., Texarkana, Ark. (Hoot Plant); Crow Material, Inc., La Joya, Texas (Crow Materials); Sprint Sand and Gravel Co., Ellinger, Texas (Sprint Pit and Plant); Unimin Corp., Gore, Va. (Gore Mine No. 1)

Upcoming Meetings

November

16-18 Mine Safety and Health Administration, short course, Dust and Noise Problems in the Mining Industry, National Mine Health and Safety Academy, Beckley, W.Va. Contact Fran Rhodes, The Academy, Box 1166, Beckley, W.Va. 25801

17-19 Control Data Corp. and Floyd C. Bossard and Associates, Inc., workshop, Computer Assisted Mine Ventilation Design Workshop, Control Data Corp.'s offices, Englewood, Colo. Contact Patricia McMulling, Control Data Corp., Box O, Minneapolis, Minn. 55440

30-Dec. 2 Mine Safety and Health Administration, short course, Coal Mine Explosion Prevention, National Mine Health and Safety Academy, Beckley, W.Va. Contact Fran Rhodes, The Academy, Box 1166, Beckley, W.Va. 25801

December

2-3 Coal Age/Engineering and Mining Journal, seminar, Fundamentals of the Mining Industry, Fee $545, Hyatt at LA Airport, Los Angeles, Calif. Contact Carol Clark, McGraw-Hill Seminar Center, Rm. 3112, 305 Madison Ave., New York, N.Y. 10017

Peabody, 2 Technicians Face Sampling Charges

The Peabody Coal Co., largest U.S. coal producer, and two of the company's dust control technicians have pleaded not guilty to charges of falsifying coal dust samples brought in a Federal indictment returned in Louisville, Ky., in late August.

The indictment alleges that the company forwarded false records to the Mine Safety and Health Administration for a number of miners at Peabody's Camp No. 2 mine near Morganfield, Ky., in 1979 and 1980.

Safety Technolgy

Stamp of Approval

The following equipment has been added to the Mine Safety and Health Administration's list of permissible or approved equipment:

- **Model R7051HE full facepiece respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **Models R4052HE, R5052HE, and R6052HE half mask respirators,** issued to American Optical Corp., Southbridge, Mass.;
- **Models R4054HE, R5054HE and R6054HE half mask respirators,** issued to American Optical Corp., Southbridge, Mass;
- **Model R7054HE full facepiece respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **Model 1482-G104-G208 half mask respirator,** issued to H. S. Cover Co., Buchanan, Mich.;
- **Models 2104-00, 2204-00, and 2304-00 half mask respirators,** issued to USD Corp., Santa Ana, Calif.;
- **Model 3204-00 full facepiece respirator,** issued to USD Corp., Santa Ana, Calif.;
- **Hypalon-jacketed power cable,** issued to Anaconda-Ericsson, Marion, Ind.;
- **Neoprene-jacketed high voltage power cables,** issued to Rome Cable Corp., Rome, N.Y.;
- **Hypalon-jacketed high voltage power cables,** Code No. 010979, issued to Rome Cable Corp., Rome, N.Y.;
- **Hypalon-jacketed high voltage power cables,** Code No. 022482, issued to Rome Cable Corp., Rome, N.Y.;
- **Chlorinated polyethylene-jacketed type SO control cords,** issued to Carol Cable Corp., Pawtucket, R.I.;
- **Neoprene-jacketed high voltage mine power feeder cables,** issued to Essex Group, Marion, Ind.;
- **CMS coal mine splice kit,** issued to Raychem Corp., Menlo Park, Calif.;
- **Hypalon-jacketed control cords,** issued to BIW Cable Systems, Inc., Boston, Mass.;
- **Neoprene-jacketed high voltage power cable,** issued to Pirelli Cable Corp., Union, N.J.;
- **Polyvinyl chloride-jacketed high voltage mine power cables,** issued to Pirelli Cable Corp., Union, N.J.;
- **Neoprene-jacketed portable power cables,** issued to Pirelli Cable Corp., Union, N.J.;
- **Neoprene-jacketed portable power cables,** issued to Pirelli Cable Corp., Union, N.J.;
- **NBR/PVC-jacketed high voltage power cables,** issued to Pirelli Cable Corp., Union, N.J.;
- **Heavy duty polychloroprene-jacketed power cable,** issued to Hawker Siddeley, Inc., Atlanta, Ga.;
- **"ALP 500" PVC as flame-resistant material for lining battery box covers,** issued to Alpha Fabricators, Inc., Naperville, Ill.;
- **Scandura dualine conveyor belt,** issued to Scandura, Inc.; Charlotte, N.C.;
- **Uniroyal Mineflex FOR—or Uniroyal USFlex Grain FOR (Belt #169),** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Uniroyal Mineflex FFOR or Uniroyal USFlex Grain FFOR (Belt #170),** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Model R7052HE full facepiece respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **Models R4053HE, R5053HE and R6053HE half mask respirators,** issued to American Optical Corp., Southbridge, Mass.;
- **Model R7053HE full facepiece respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **Uniroyal Mineflex FOR-NS (Belt #171),** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Uniroyal Mineflex II FOR or Uniroyal USFlex Grain FOR (Belt #172),** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Uniroyal Mineflex II FFOR or Uniroyal USFlex II Grain FFOR (Belt #173),** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Uniroyal Mineflex II FOR-NS (Belt #174),** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Uniroyal Mineflex II FFS or Uniroyal USFlex Grain FFS conveyor belt,** issued to Uniroyal Industrial Products, Port Clinton, Ohio;
- **Start CO FR conveyor belting,** issued to Mitsuboshi Belting Ltd., Kobe, Japan;
- **Start FR-G conveyor belting,** issued to Mitsuboshi Belting Ltd., Kobe, Japan;
- **Model No. P-16 power supply and accelerometer,** 15 volt, battery-powered, issued to BBN Instrument Co.; Cambridge, Mass.;
- **Model No. 8SG8081 digital voltmeter,** 12 volt, battery-powered, issued to Siemens A. G. Germany, Erlangen, German;
- **Model SH20-S battery tractor,** 120 volt, d.c., with one 20 or 25 hp tram motor and one 5 hp, 60 volt d.c. pump motor, issued to S&H Manufacturing Co., Hueyville, Ky.;
- **Model RRB-1 remote roof bolter,** 460 volt, 3 phase, 60 hertz, a.c., with one 40 hp and one 7.5 hp, 460 volts, 3 phase, 60 hertz, a.c. motors, issued to the U.S. Bureau of Mines, Spokane, Wash.;
- **Longwall mining system** 950 volt, 3 phase, 60 hertz, a.c., with two 250 hp, two 160 hp, two 75 hp, one 120 hp, one 100 hp, one 10 hp, one alternate 400 hp, one alternate 200 hp, one alternate 50 hp, 950 volts, 3 phase, 60 hertz, a.c. and one 250 volt, 35 hp, d.c. motor, issued to Kaiser Steel Corp., Sunnyside, Utah;
- **Model TB2000 continuous miner,** 950 volt, 3 phase, 60 hertz, a.c., with two 200 hp, one 300 hp, 950 volt, 3 phase, 60 hertz, a.c. motors, issued to Dosco Corp., Beckley, W.Va.;
- **Model LR-27 roof bolter with integral dust collection system,** 440 volt, 3 phase, 60 hertz, a.c., with one 40 hp motor, issued to Epling Manufacturing Co., Grundy, Va.;
- **Longwall mining system,** 950 volt, 3 phase, 60 hertz, a.c., with two 300 hp, two 160 hp, four 100 hp, and one 15 hp, 950 VAC and one 35 hp, 250 VDC motors, issued to Line Power Manufacturing Corp., Bristol, Va.;
- **Model ETD2-460/575 trickle duster,** 460/575 volt, 3 phase, 60 hertz, a.c., with one 2 hp, motor, issued to Deron Corp., Morgantown, W.Va.;
- **Model HD1503 local heat detection system,** battery-powered, issued to Comtrol Corp., Irwin, Pa.;
- **Model MP-1120 mine page phone,** 12 volt, battery-powered, issued to American Mine Research, Bluefield, W.Va.;
- **Model LRB-25 roof drill with integral dust collecting system,** issued to Marmon Research, Knoxville, Tenn.;
- **Model TD2-34 roof drill with integral dust collecting system,** issued to Lee-Norse Co., Pittsburgh, Pa.;
- **Types 120H2, 123H, and 123HR "Heliminer" continuous miners,** 4160 volt, 3 phase, 60 hertz, a.c., with two 300 hp, motors, issued to Jeffrey Mining Machinery Div., Columbus, Ohio;
- **Model ELSA 070.117.00 5-minute, continuous flow,** hood emergency life support apparatus, issued to Sabre Safety Ltd., Aldershot, Hampshire, England;
- **Scott P/N 900480-01 combination constant flow air line with Egress self-contained breathing apparatus,** issued to Scott Aviation, Lancaster, N.Y.;
- **P/N 9870 and 9871 one hour, open-circuit, pressure-demand, compressed-air, self-contained breathing apparatus,** issued to U.S.D. Corp., Santa Ana, Calif.;
- **Racal Airstream Model AH38 Type C,** continuous flow class supplied-air respirator, issued to Racal Airstream, Inc., Rockville, Md.;
- **Breezer AB4, HH4, VB4, VH4, SB4 and SH4 powered air purifying respirators,** issued to Neoterik Health Technologies, Inc., Mount Airy, Md.;
- **R4051E, R5051E, and R6051E half mask respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **R7051E full facepiece respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **R4051EP, R5051EP, R6051EP half mask respirators,** issued to American Optical Corp., Southbridge, Mass.;
- **R7051EP full facepiece respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **DeVilbiss MSL-500 half mask respirator,** issued to American Optical Corp., Southbridge, Mass.;
- **MBC cold splice kit,** issued to MBC Associates, Clarksburg, W.Va.;
- **Vibrathane B-601,** cable reel insulation, issued to Joy Manufacturing Co., Franklin, Pa.;
- **Vibrathane B-614, cable reel insulation,** issued to Joy Manufacturing Co.; Franklin, Pa.;
- **Uniroyal giant fire resistant (GFR),** issued to Uniroyal, Ltd., Bracebridge, Ontario, Canada;
- **Uniroyal giant fire resistant low,** issued to Uniroyal, Ltd., Bracebridge, Ontario, Canada;
- **Uniroyal giant fire resistant oil,** issued to Uniroyal, Ltd., Bracebridge, Ontario, Canada;
- **BB-Gun-ite sealant,** issued to B-Bond Industries, Greensburg, Pa.;
- **The stopping plaster, sealant,** B-Bond Industries, Greensburg, Pa.;
- **Cover compound 56095 for use as cover on hydraulic hose,** issued to BTR Hose Ltd., Farington, Leyland, Preston, Lancashire;
- **Model LST-5S, diesel-powered scooptram,** issued to Wagner Mining Equipment Co., Portland, Ore.;

Coal Mine Injury Rates Down in First Half of 1982

Injury rates per 200,000 employee-hours	1981	January-June 1982
Fatal injuries	0.07	0.06
Nonfatal injuries with days lost	7.35	7.07
Injuries with no days lost	1.49	1.33
All reported injuries	8.92	8.47

Rates are for all U.S. coal mine operations, officeworkers included.

1982 data are preliminary.

Detail may not add to total because of rounding.

Source: Mine Injuries and Worktime, Quarterly.

UNITED STATES
GOVERNMENT PRINTING OFFICE
Superintendent of Documents
Washington, D.C. 20402

Official Business

Postage and Fees Paid
U.S. Department of Labor

Third Class Mail

Lab-441

U.S. MAIL

Why share your copy of MSHA Magazine? Get more subscriptions and make everybody happy!

Subscription Order Form

Enter my subscription to Mine Safety and Health @ $8.00. Add $2.00 for foreign handling. No additional charge for mailing within the United States and its possessions. For shipment to foreign countries include additional postage as quoted.

Please print

Name — First, Last		
Company Name or additional address line		
Street address		
City	State	Zip code

☐ Remittance Enclosed
(Make checks payable to Superintendent of Documents)

Mail Order Form to:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402